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PERSONAL FACTORS IN COLLEGE ADJUSTMENT

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Editor's note: The trends of the times seem to favor more attention to the interests, needs, and capacities of the individual student. The author presents data relative to students who left the home economics course at Cornell University in their third and fourth year.

THE study here reported relates to the mortality in a group of one hundred forty-one home economics students entering the New York State College of Home Economics in September, 1937 and graduating June, 1941, and previously reported upon in the *Journal of Educational Research*.[1] The study was undertaken to summarize certain information of the type that does not lend itself to tabulation on the cumulative record card relative to students who did not continue the course.

The subjects were twenty-nine of the thirty students who left before their fourth year without expecting to return. It was necessary to omit one girl from the study inasmuch as her record was not sufficiently complete.

To summarize the essential data relative to each student's cumulative record card and other information from the girl herself, her family, . . . and staff members which appeared to have bearing on students leaving college. It was attempted to record the data objectively, eliminating the counselor's impressions and inferences, so far as possible. The data from these record sheets were studied and a classification was made of difficulties other than academic which these students encountered. Material from the high school records were included relating to the regents average, vocational choice on entrance to college, high school activities, and whether the girl took Home Economics. Material from the college records included the general college average, the Home Economics average, rank on the American Council

[1] Mercer, Margaret, "A Study of Student Mortality in a Home Economics College." *Journal of Educational Research*, 34: 531–537, March, 1941.

TABLE I

COMPARISON OF HIGH SCHOOL, GENERAL COLLEGE, AND COLLEGE HOME ECONOMICS GRADES FOR STUDENTS OF THE CLASS OF 1941 WHO LEFT BEFORE THEIR SENIOR YEAR WITH THOSE OF AN EQUAL NUMBER OF HONOR STUDENTS FROM THE SAME CLASS

	High School Average		General College Average		Home Ec. Average	
	Leaving	Honor	Leaving	Honor	Leaving	Honor
95–99	--	1	--	--	--	--
90–94	2	6	--	--	--	--
85–89	7	16	--	3	1	6
80–84	10	4	4	26	5	19
75–79	8	2	6	--	8	4
70–74	2	--	7	--	9	--
65–69	--	--	10	--	4	--
60–64	--	--	2	--	2	--

Psychological Examination, and the personal record sheet previously described.

Table I shows the high school average, general college average, and Home Economics average for the leaving group and the honor group of those girls entering the New York State College of Home Economics as freshmen in the Class of 1941. The general college average and Home Economics average for those who left without receiving a degree are cumulative averages to the time of leaving. For the honor group, the averages are cumulative averages to the time of graduation.

The principal items of importance that emerge from Table I are:

1. Seventeen of the twenty nine students who left without receiving their degrees had maintained the cumulative general average of seventy which this College requires.

2. Twelve students of the leaving group had general averages below seventy while only six had Home Economics averages below seventy. The implication may be drawn that especial difficulty with Home Economics courses did not contribute largely to the fact that twenty nine girls from this class did not complete their college course.

Table II shows the decile rank on the American Council Psychological Examination for the leaving group and the honor group from this class both for Cornell University freshmen and for all college freshmen.

Table II shows that while twenty of the girls who left without receiving a degree fell in the upper fifty per cent of all college freshmen in college

TABLE II

DECILE RANK OF HONOR AND LEAVING GROUP ON AMERICAN COUNCIL PSYCHOLOGICAL EXAMINATION FOR CORNELL UNIVERSITY FRESHMEN AND FOR ALL COLLEGE FRESHMEN

Decile	Cornell University Freshmen		All College Freshmen	
	Honor	Leaving	Honor	Leaving
I	2	1	17	3
II	4	2	6	6
III	4	--	2	2
IV	8	1	4	4
V	2	4	--	5
VI	4	1	--	1
VII	1	1	5	--
VIII	4	5	--	1
IX	--	6	--	1
X	--	7	--	--

aptitude as measured by the American Council Test, only eight of them fell in the upper half of the Cornell University freshman group. In other words, a girl whose score is in the fifth decile for the entire college population falls in the eighth decile for Cornell University freshmen. This makes it apparent that a girl may be good college material generally but yet may be a poor risk in this University.

Table III shows the reasons given for leaving college by the twenty nine members of the Class of '41 who left without receiving their degrees.

While many of these students encountered financial difficulties, only two girls left primarily for that reason. The small number leaving because of financial problems may be explained as due chiefly to the student work program administered by the Office of the Dean of Women and directed by one of the assistants to the Dean. Opportunities to earn have been developed to the point to which it rarely becomes necessary for a capable student to give up college completely, though some may require more than four years to complete the course.

TABLE III

REASONS GIVEN FOR LEAVING COLLEGE BY MEMBERS OF A CLASS IN THE NEW YORK STATE COLLEGE OF HOME ECONOMICS WHO LEFT BEFORE BEGINNING THEIR SENIOR YEAR

Transferred to another type of college course	7
Went to business school	3
Dropped because of poor grades	11
Married	6
Finances	2

As has been said, an individual record sheet was prepared for each student summarizing data from the cumulative record card and any information from the girl herself, her family, and other staff members which appeared to have any bearing on her leaving college.

Another person also interested in student mortality in Home Economics colleges read the material and made an independent analysis of the problems. This was compared with the classification made by the writer and found to be much the same except for minor differences in statement. The final classification of problems was made from an organization of what personal material was available and should be regarded as suggestive rather than complete.

General classification	*Evidenced by such things as*
Poor physical condition or health habits.	Report of illness verified by college health service or home town physician.
	Confinement in infirmary sufficient to cause girl to miss so many classes that she encountered difficulties in catching up with her work.
	Excessive fatigue reported by girl or commented upon by instructors.
	Need to lighten schedule because of illness, overfatigue, etc.
Dislike for college curriculum.	Student reporting in conference general dissatisfaction with requirements of curriculum and course work.
Difficulties in social and personal adjustment.	Difficulties with other students or instructors.
	Failure to pledge desired sorority.
	Expressed dissatisfaction because of not making friends as rapidly as she might wish.
	Extreme shyness with instructors.
Problems in family relationships.	Feeling she is not free to make schedule changes without explaining to parents and receiving permission.
	Parents determining vocational choice.
	Need to match achievement of another child in the family.
	No definite allowance. Must explain and defend each expenditure.
Financial problem.	Difficulty in meeting necessary expenses.
	Higher standards of living than she can afford.
	Not always a shortage of money for necessities, but may be the result of the girl's inability to manage what she has, or the desire to keep up with a group with more money.

The following abbreviations are used for the classification of difficulties other than academic:

PP	Poor physical condition or bad health habits.
DC	Dislike for college curriculum.
AW	Felt she had as much from college as she wanted.
SP	Difficulties in social and personal adjustment.
FR	Problems in family relationships.
A	Participation in college activities.
FP	Financial difficulties.

Table IV summarizes data other than academic for the group who left college without returning for their senior year. The high school average, college average, and results on the American Council Psychological Examination for the general population of college freshmen as well as for the Cornell freshman class are included also. Following it is Table V which summarizes similar information for an equal number of honor students.

1. It is apparent from consideration of Tables IV and V that problems of health, family relationships, and finance predominate in the group who left college without receiving a degree.

2. There was little difference in the numbers of the two groups listed as meeting difficulties in social or personal adjustment. The girls in the leaving group tended to deal less adequately with the problems encountered than those in the other group.

3. All of the honor group took part in college activities. One third of the leaving group did so, and of that third half can scarcely be said to have done so since the activity was minor and the participation slight.

4. Four of the twenty nine leaving students were girls who were outstanding students and apparently equally superior in personality adjustments. Two transferred; two married. In each case the decision to do so was made after careful consideration of what was the wisest course to follow. The same conclusions may be drawn in two other cases though the girls were less successful academically than the ones already mentioned.

CONCLUSIONS

1. Study of scores made in the American Council Psychological Examination indicate that a girl may be what is generally known as good college material and yet encounter difficulty in this University. In the Class of '41 a girl whose score is in the fifth decile for the entire population of college freshmen fell in the eighth decile for Cornell University freshmen.

TABLE IV

SUMMARY OF ACADEMIC AND NON-ACADEMIC INFORMATION CONCERNING THE GROUP OF STUDENTS FROM A CLASS IN THE NEW YORK STATE COLLEGE OF HOME ECONOMICS WHO DID NOT ENTER THE SENIOR YEAR

Student	HS Av. Regents	Vocational choice on entrance	%ile Am. Council all college freshmen	Decile Cornell freshm.	College Average Leaving	Reason for leaving	Earned main part of expenses during college	Worked 1 or more summers	Sorority member	PP	DC	AW	SP	FR	A	FP
1	84	dietetics	58	8	74	transfer (science)	x	x	x	x	x					x
2	78	4H agent	51	9	74	marry							x	x		x
3	90	dietetics	64	8	76	transfer (short foods course)				x	x		x	x		
4	84	teaching	58	9	74	bus. school	x	x	x	x			x			x
5	85	dietetics	96	2	65	dropped			x		x				x	
6	87	dietetics	87	4	78	marry			x				x		x	
7	75	dietetics	32	10	68	dropped	x	x							x	
8	76	dietetics	38	10	69	dropped				x			x	x	x	
9	74	costume design	32	10	70	transfer			x					x		x
10	75	commercial clothing	58	9	68	dropped		x	x					x		x
11	84	undecided	64	8	78	marry		x				x				x
12	78	journalism	75	7	68	dropped			x	x				x		x
13	80	dietetics	32	10	69	dropped			x							
14	78	nursery sch.	64	8	68	dropped			x				x	x	x	
15	85	commercial clothing	87	5	76	transfer			x	x		x	x	x		
16	83	undecided	84	5	65	dropped	x	x				x				x
17	75	teaching	15	10	61	dropped	x	x		x			x	x		x
18	91	undecided	100	1	81	transfer									x	
19	88	journalism			80	marry			x						x	
20	89	dietetics	84	5	83	marry			x							
21	83	teaching	80	6	74	bus. school	x		x	x		x			x	x
22	87	undecided	90	2	68	dropped		x		x			x	x		
23	82	dietetics	84	5	76	left—disliked college	x		x		x					
24	80	commercial clothing	64	8	70	bus. school		x	x	x	x			x		x
25	78	undecided	45	9	73	marry			x			x		x		
26	85	nursery sch.	26	10	80	transfer			x						x	
27	81	dietetics	58	9	69	dropped			x						x	
28	80	teaching	51	9	78	marry	x	x	x			x			x	
29	73	undecided	20	10	55	dropped								x		

27	81	dietetics	58	9	69	dropped			x					x	
28	80	teaching	51	9	78	marry			x					x	
29	73	undecided	20	10	55	dropped	x	x	x		x		x	x	

TABLE V

SUMMARY OF ACADEMIC AND NON-ACADEMIC INFORMATION CONCERNING A GROUP OF HONOR STUDENTS FROM A CLASS IN THE NEW YORK STATE COLLEGE OF HOME ECONOMICS

Student	HS Av. Regents	Vocational choice on entrance	%ile Amer. Council all col. frshm.	Decile Cornell freshmen	College average 3d year	Earned ½ or more	Sorority member	PP	DC	AW	SP	FR	A	FP
1	85	teaching	95	3	81	x							x	
2	84	teaching	97	2	81								x	x
3	87	extension	95	3	82	x					x		x	
4	83	undecided	80	6	83							x	x	
5	89	teaching	80	6	82	x							x	
6	88	teaching	96	2	82		x						x	
7	89	dietetics	64	8	81	x	x						x	
8	87	teaching	75	6	82		x						x	
9	86	extension	93	3	82	x					x		x	x
10	79	teaching	64	8	83	x		x					x	
11	86	undecided	70	7	81	x	x				x		x	x
12	87	undecided	90	4	81								x	
13	86	teaching	64	8	81		x						x	
14	91	teaching	96	2	84	x							x	
15	86	extension	80	6	81	x	x						x	
16	90	dietetics	90	4	83						x		x	
17	85	dietetics	87	4	86	x	x					x	x	
18	88	teaching	90	4	84	x							x	
19	95	undecided	100	1	87						x		x	
20	81	teaching	93	3	82						x		x	
21	84	teaching	84	5	82		x						x	
22	93	teaching	90	4	84	x							x	
23	89	undecided	90	4	83		x				x		x	
24	94	extension	99	1	84	x							x	x
25	93	dietetics	93	4	86								x	
26	89	managerial foods	93	2	83		x						x	
27	92	teaching	84	5	83	x	x					x	x	
28	87	nursery sch.	90	4	82									
29	77	commercial foods	58	8	81		x		x				x	

2. Study of high school records and college aptitude tests indicate that half to two-thirds might have been expected to do reasonably successful college work. Actually more than half of them did maintain satisfactory academic standing.

3. Half of the leaving students had Home Economics in high school and thus had received some introduction to Home Economics subject matter. One third of the honor group had taken high school Home Economics.

4. There is nothing to indicate that the unsatisfactory adjustments made by most of this group are due to the fact that they were enrolled in a Home Economics curriculum rather than in some other. It is recognized that the available data may not have yielded this information.

5. Consideration of the personal information available for the two groups makes it apparent that:

a. problems of health, family relationships, and finance predominate in the group who left without receiving a degree.

b. the leaving group were less active participants in the affairs of the college community than were the honor group.

c. fewer members of the leaving group earned a major part of their college expenses than did the honor students.

6. About a fourth of the total group were girls whose decisions to marry or to transfer to other colleges were, from all indications, wise choices. It must be emphasized that there is nothing sacred about attending college for four years as opposed to one, two, or three years. It must also be emphasized that transferring from one type of course to another may indicate increasing maturity and vocational focus.

7. In about three fourths of the leaving group problems of health, personal and family relationships, and finance were present. Study of this group is of value not only because it throws light upon reasons for leaving college but because it makes clear the type of difficulties influencing the academic achievement of all college students. This exploratory study indicates that greater use of the case study method to investigate the personal factors influencing success in college would be desirable.

CORRECTIVE READING AT SIX CENTS PER PUPIL

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Editor's note: Reading is one of the most important subjects in the school curriculum. The authors present data upon the results of a remedial program in this area.

READING is the most important subject taught in the first twelve grades of school. If a student is graduated from high school with the ability to read with speed, intelligence, and creative imagination, there is no field of academic endeavor in which he cannot succeed. On the other hand, the inability to read is probably responsible for more failures from the first grade through college than any other single disability.

Reading is an extremely complicated process. Ideally the teacher and the supervisor should make a case study of every child before he constitutes a case of reading disability. Educators will agree that money spent in the primary grades, especially the first, in determining reading readiness and ascertaining the best methods for the beginning of the reading process, is money saved. The fact remains, however, that we have in high schools today a vast number of students whose struggles to acquire learning in the book-centered school are headed straight for failure and permanent dislike for the printed page. It is not necessary, however, for the school executive with limited funds merely to shrug his shoulders. Students in high school can, with no extra teaching staff and without interfering with the normal program of work, be made to gain one or more years in reading grade in a period of six months. The total cost per pupil need not exceed six cents. These figures are based upon an experiment conducted in the Platoon High School in Bennington, Vermont, during the school year 1937–1938.

CHALLENGING TEACHER AND PUPIL INTEREST

The first step in handling a reading program lies in securing the interest and sympathy of all the teachers in the system. This is not easy, for it is a fact that the majority of the teachers do not read the professional magazines, are only vaguely aware of factors involved in the situation; and

because they do not know, they often do not care. It is almost an axiom that every teacher is a teacher of reading. For this reason, the interest of every teacher must be elicited. The method used in accomplishing this in Bennington was a series of teachers' meetings. The administrator distributed to all his teachers a series of outline guides dealing with various phases of reading: the child, his physical, mental, emotional, and experience background; the physical aspects of the classroom; the materials; various methods in teaching reading; reading disabilities and their correction; and the testing program. A small library of professional literature was placed at the disposal of the teachers. Enthusiastic teachers' meetings created among all teachers a 'reading readiness' without which a program is helpless.

Secondly, the pupils themselves must be challenged. Time was taken to talk the matter over with the students, to show them graphic illustrations of their weakness, and to make a competitive game of any corrective procedure. High-school pupils rarely study for the love of study. They are practical enough, however, to see that when they increase their reading speed from 150 to 300 words per minute with equal comprehension, their lessons are done in half the time.

TESTING PROGRAM

The testing program is intimately related to the challenging of both teacher and pupil interest. It resembles a road map in that it tells you where you are and how far you have to go before you arrive at your destination. The choice of a standard test depends upon a number of factors outlined by Gates in his "Reading for Public School Administrators."[1] There is no such entity as "reading ability". Therefore, it is essential that a test be chosen which measures as many as possible of the different skills involved in reading. If economy is not an item to be considered, a battery of several tests is preferable to any one test. A test having more than one form is necessary so that retests may be given and gains measured. The norms and standards of comparison should be up to date, and should have been carefully determined by experts. Generally speaking, a test which consumes about an hour of testing time is preferable to a shorter test for, other things being equal, the longer the test the more reliable it is. In this experiment, the Iowa Silent Reading Tests were given to nearly 700 chil-

[1] Gates, Arthur I. *Reading for Public School Administrators,* (New York: Teachers College, Columbia University, Bureau of Publications, 1931), pp. 112–113.

dren in grades VII through XII. These tests measure paragraph meaning, word meaning, selection of central idea of paragraphs, sentence meaning, location of information, and rate of silent reading, and contain paragraphs from several types of reading material including science, history, and literature. The testing time of the elementary test is 42 minutes and of the advanced test 35 minutes. Each test takes nearly an hour to administer when one allows for passing out materials, for giving directions, and for other necessary preliminaries. The tests are roughly diagnostic for the individual pupil and indicate trends of weakness in the group as a whole. The results of the tests given in October are listed in Table I.

The scores are given in years and months of reading age. Thus, section 7C which should be, in October, 7 years and 1 month in reading age, has a reading age of 5 years and 8 months in comprehension and 4 years and 5 months in speed. The figures in Table I represent the median scores of the 23 sections involved in the reading project.

Median scores for the different sections indicate that in October, 13 of the 23 sections were retarded from 2 to 22 months in comprehension, and 19 sections were retarded in speed of reading from 2.5 months to 44

TABLE I

RESULTS OF OCTOBER TESTS

Grade	Norm	October Comprehension Score	October Speed Score
7 A	7.1	7.7	7.4
7 B	7.1	6.7	5.0
7 C	7.1	5.8	4.5
8 A	8.1	9.65	8.75
8 B	8.1	7.6	7.85
8 C	8.1	5.9	3.7
9 A	9.1	9.75	11.0
9 B	9.1	9.3	10.0
9 C	9.1	8.3	7.4
9 D	9.1	7.6	6.9
9 E	9.1	7.1	6.0
10 A	10.1	11.9	9.6
10 B	10.1	10.2	8.9
10 C	10.1	9.8	8.5
10 D	10.1	8.4	8.3
11 A	11.1	13.5	10.6
11 B	11.1	12.3	9.9
11 C	11.1	10.9	9.6
11 D	11.1	10.8	8.5
11 E	11.1	10.55	8.3
12 A	12.1	14.0	10.4
12 B	12.1	12.7	9.6
12 C	12.1	11.5	8.5

months of reading age. One section of the eighth grade was found to have a reading comprehension grade of 5 years and 9 months and a reading speed grade of 3 years and 7 months. A group of seniors were found to be reading with a median speed of the eighth grade. These figures will be recognized to be typical. They represent a cross section of the reading ability of students in any average high school where no particular attention has been given to corrective work.

The use made of the test results justifies the cost of administration. Analysis should be in terms not only of comparison with standard norms but also of study of specific weakness of individuals and classes. The results of the tests indicated the greatest weakness in the speed of silent reading, in outlining, and in selection of key words for the use of the index. The drive for corrective procedures was concentrated along these lines.

REMEDIAL PROGRAM—CORRECTION OF VISUAL DEFECTS

The first point of attack is obvious. How many of these children are suffering from reading disability because they cannot see? The Snellen tests commonly used in schools are no longer considered adequate. The process of testing a large number of children with the telebinocular instrument is a long one.[1] The students having pronounced difficulties were tested first. Of the first group of 16 cases of severe reading disability, 14 were found to be suffering from eye defects. The school made no attempt to prescribe for these cases, but a notice was sent to the parents stating that eye tests given at the school indicated a vision difficulty, and recommending that pupils be taken to a specialist. In most instances children visited specialists, glasses were secured, and reading improvement followed.

DEVELOPMENT OF SPEED IN READING

There are, however, many students with normal eyesight who still do not read well. In Bennington, the greatest single weakness was in speed of reading.

The necessity for speed in reading has not been recognized until comparatively recently. In fact, the student of a few years ago had less need

[1] The telebinocular instrument is a machine made by the Keystone View Co. described by Emmett Betts in "The Prevention and Correction of Reading Difficulties," Row, Peterson & Co. It provides very accurate tests of fusion, visual efficiency, and sharpness of image in a series of 8 tests made with slides and easily administered by any teacher with a minimum of practice.

for speed than the student of today. Whereas the older type of teaching provided that the student master the facts of a given textbook and reproduce them on an examination, modern teaching sends the student abroad into all sorts of fields to feed his mind from many sources. To take a specific example, in the field of history, the modern student does most of his work by the reading of biography and historical novels, by perusing newspapers and magazines, and by using reference material. There is a vast difference between the reading requirements of such a student and those of the student whose lesson is complete when he has digested ten pages of his text. Naturally, the optimum speed of reading can never be stated in terms of words per minute. The rate of reading should vary with the difficulty of the material and with various other factors. However, a certain habit leading to speed of reading can be taught, and the student can be brought to understand that he must adjust his speed to suit the type of reading he is doing.

MATERIAL FOR SPEED TRAINING

Practice in speed of reading is not easily provided without special materials. The ordinary textbook has a vocabulary too difficult to foster an increase in speed, and the time element should be so controlled that the exercises for the development of speed take the form of a contest which the student plays with himself to increase his own score.

The vocabulary burden of reading material selected for the development of speed is of vital importance for two reasons. Unfamiliar words, as Gates has proved experimentally, frustrate every effort to establish rhythmical eye movements. They accentuate the tendency to reversion which is prevalent among poor readers, and they interfere seriously with the development of speed. Secondly, unfamiliar words discourage the student who, in all probability, finds reading at its best a discouraging job.

The results of Gates' experiments with the vocabulary of primary readers are, we believe, also applicable to the reading of older students. He found a 30–40 per cent superiority in reading ability among those children who had been trained with the use of a large amount of easy supplementary reading, in which new words were introduced infrequently, over those pupils who were taught by word drills and other artificial methods.[1] He concludes

[1] Gates, Arthur I. *Interest and Ability in Reading*, (New York: Macmillan Co., 1931), p. 38.

that the development of a vocabulary through seeing the words in context is the most desirable method, partly because it is far more interesting to pupils than formal drill.

One of the outstanding virtues of the Hall–McCreary series of readers used in this experiment[2] is its intelligent handling of the vocabulary burden. The authors have used a vocabulary within the reach of all high-school students. An examination of three consecutive pages of the most advanced book of the series reveals only three words not found in Thorndike's list of the 10,000 most common words in English. The three words are: bacteria, baronet, and seventieth. Of the 661 running words on these three pages, 532, or over 80 per cent are found in the first 1,000 of Thorndike's list.

The books consist of stories and scientific and biographical articles of great intrinsic interest to high school students. Many of them have a close connection with work in science and history. The students are not "wasting time" on speed drills; they are accumulating worthwhile information at the same time.

APPLICATION OF MATERIAL

These drill exercises in speed were given only to those students who were below norm in speed or comprehension, or both. This constituted about 80 per cent of the students. Actually, about 90 per cent took part in the exercises which created so much interest that others wished to try to improve their scores even though they were at or above the norm. English classes were so seated in the rooms that the few students who did not take the exercises were in a separate section and were free to do any type of reading in which they were interested. As soon as the students learned the procedure, the exercises were completed in the first ten minutes of the class hour, after which the regular work in English was carried on. The amount of time expended on the program was, thus, no serious subtraction from the time ordinarily expended upon the English program.

The student reads the article or story as fast as possible. He is timed for his first two minutes of reading. At the end of each paragraph in the books there is a number enclosed in parentheses indicating the total number of words in the article up to that point. Thus, by a brief process of counting

[2] "Four and Twenty Famous Tales," "Forty Famous Stories," "Washington to Lindbergh," "Wonder Stories from Nature," "Heroes of Health." Hall & McCreary Company, Chicago, Illinois.

and dividing by two, the student can ascertain his reading speed per minute. He competes with himself by keeping a record of his daily performance.

His comprehension is never sacrificed to speed. When he finishes reading the story, he turns to the back of the book where he finds a completely objective test on the content of what he has just read. His score upon this test, which he can take in two or three minutes, indicates to him whether he has understood what he has read.

The Hall–McCreary series was not designed for nor would it be effective in the treatment of severe reading disabilities. Bad cases of reversals, stuttering, poor mental imagery, narrow eyespan and other deep-seated difficulties will be affected very little by these exercises or any other drill material designed for general class use. Cases of severe disability require individual diagnosis leading to specific individual treatment. The encouraging aspect of the situation is that there are relatively few cases in the high school of severe disability. Many cases which appear to be such yield quickly to very simple treatment.

RESULTS OF SPEED TRAINING

Very remarkable gains were made in speed with the use of these exercises. One class of 27 students who read lessons 1 and 2 at an average speed of 234 words per minute, read lessons 24 and 25 at an average speed of 499 words per minute, a gain of 265 words per minute. Certain individuals made even more remarkable gains. Table II represents the scores of five such individuals:

TABLE II

Pupil	Average Score Lessons 1 and 2	Average Score Lessons 24 and 25	Speed on Iowa Tests	
			Oct., Form A	May, Form B
A	288	1275	9. 6	14 plus
B	305	886	9. 9	14 plus
C	214	772	9. 6	10. 6
D	197	677	8. 4	14 plus
E	254	611	9. 1	14 plus

When these results were obtained, the fear was expressed that these remarkable gains represented an increase in the speed of reading this particular type of story which would not carry over to other types of reading.

That this was not the case was proved when these same students were tested in May with form B of the Iowa tests.

EXTENSIVE READING PROGRAM

The corrective program was, however, far from just a series of drill exercises in speed. Everything possible was done to interest the children in reading which would return them huge profits in the way of enjoyment as well as in scores on the tests. In all classes a basal literature book was used because of the necessity for some study of the types of literature in which all members of the class might have a common experience. However, homework assignments were rarely given in these books, the idea being that the outside reading of the children should be of a highly voluntary nature, that reading might be a pleasure, never a task. For this purpose, a start was made during the year in the purchase of classroom libraries containing materials which would possess a high interest value and foster the reading habit.

The cost of the 100 books purchased during the year is not included in the six cents per pupil cost of the special reading program, for they were purchased with money which would otherwise have been spent upon more supplementary readers of a type similar to the basal readers and literature books. Hence they were not considered an extra expenditure.

MATERIAL FOR EXTENSIVE READING

Great care was taken to choose books known to be favorites with children and to provide a wide variation in difficulty so that children could be guided to books which would suit their abilities without being aware of the fact that they were often reading materials with vocabulary of the 5th or 6th grade.

The most difficult problem of the whole year was the choice of materials for the work. Many book companies produce materials "for remedial reading" and "for slow groups". Most of this material has not been scientifically prepared. In the elementary grades, a great deal has been done in preparing reading materials based upon the results of experimental study. The same is not true of the high school.

A book company sent to Bennington on approval a series of fifteen story books recommended for "slow readers" in the seventh and eighth grades. Upon superficial examination they seemed to be a fine addition to

the library. A study of the books revealed, however, that one of them was written in the dialect of the southern mountains, with spellings which would confuse an adult; that two others made use of the archaic forms of the second person pronouns, a style which most children do not like; that one of the books contained on five consecutive pages chosen at random twelve words not in the Thorndike list, and 11 others between 8,000 and 10,000 in the Thorndike list. These included such words as morass, precipitous, cavalcade, copious, and inedible. These words would be difficult for good readers of the eighth grade. Only six of the fifteen books were considered to be suitable for purchase. A little practice with the standard vocabulary lists, unsatisfactory as they are at present, will enable a supervisor to save a good deal of money. It is an economy for any school system to delegate the duty of the examination of books recommended for purchase to some person who is given the time to make such a study.

Naturally, the vocabulary burden is not the whole story. Sentence structure and difficulty of concepts in the materials must be taken into account. Unfortunately, these matters must be, for the present, largely a matter of subjective judgment. Until the high-school materials are better graded, however, it is not safe to rely upon the advertising statements of the book house.

It is not proposed by these statements that all language be impoverished and children introduced to none of the great stylists but merely that children be led up to them by an inductive process which starts at the child's level and does not breed in him a profound dislike for Hawthorne because he cannot read him. Thousands of children will never in their lives voluntarily open a volume of Shakespeare or Dickens because they were introduced to them in a way which made them a grind, a hard task. The book was opened with reluctance and closed with joy. Yet the idea somehow persists that we have neglected our duty if we have not choked the classics down a certain number of resisting throats and subjected a certain number more to the ignominious failure because they simply could not digest these rare foods. Too high a standard and the same standard for all defeats itself. Children do not dislike well-written books because they are well-written or because there is subtle characterization. When they dislike these books, it is because they do not understand them. Books do not have to be bad literature to be satisfactory; those who protest that the classics are being replaced by cheap trash in the English classroom misconceive the whole idea. We are gradually

moving toward a time when our books will be scientifically prepared. Vocabulary and sentence structure must not thwart the comprehension of what the book tells, and what it tells must be something that the pupil cares about knowing or can be made to care about. We shall prepare the child for the classics, not thrust them upon him unawares. While we are waiting for the better preparation of high-school texts, we must select with discretion and use with wise insight the materials we have.

PART PLAYED BY NON-ENGLISH TEACHERS

The statement has been made by Professor McKee in "Reading Readiness"[1] that the child does not read with the words on the page. They are merely symbols to which the child attaches concepts of his own which have somehow arisen out of his past experience. His concepts may be clear and vivid or they may be inaccurate or false. The concepts that the child possesses are not entirely within the control of the school. The child who has visited a big store knows exactly what the word *escalator* means. His conception of it is sensory as well as mental. The child who has merely had the word explained to him may have a vague or inaccurate picture, certainly not so vivid as the one drawn from experience. With this theory of the importance of the concept in mind, every teacher of content subjects made a special effort to teach the vocabulary of her subject whenever possible by concrete illustration, or at least, by a vivid oral description. Textbooks are not yet well enough written to prevent the child from getting inaccurate concepts. It is the responsibility of every subject teacher to see that the students develop in this direction within the field of his subject. In this part of the program non-English teachers played a vital role. While the English teachers bore the brunt of drill work, other teachers were of invaluable assistance by lending moral support and furnishing practical aid in developing the vocabularies of their own subjects and encouraging reading related to their subjects.

OTHER DEVICES TO DEVELOP GOOD READING HABITS

Most of the reading of a literary nature was voluntary. In the opinion of the writers, this was of great importance. Children were encouraged to use the public library; books were borrowed from this library, and from the

[1] McKee, Paul. "Reading Readiness," Houghton, Mifflin Company.

state library for use in the classrooms; books were brought by both teachers and students from home; and always they were there, a constant invitation to pleasure. A distaste for reading, is often more harmful than actual lack of ability. Conversely, nothing increases reading power so surely as happy experience in reading.

One teacher made it a practice every day to talk informally to the class about some book in which she was interested. The success of the scheme depends to a considerable extent upon the teacher's own interest. She must be willing to read books herself. She must know where in the book there is an enticing bit which she may read aloud to arouse the curiosity of the class; she must know her students well enough so that she may place a book with considerable assurance in the hands of some particular student. The student is pleased to be thought of personally, and his recommendation a few days later is all that the book needs to go the rounds. Most of all, the teacher must not try to thrust books upon the children. Most boys dislike "Pride and Prejudice", and there is little excuse for the teacher who recommends it highly to them. A few such mistakes will destroy the confidence of the children in the teacher's statements about books.

Library periods, occurring at least once a week, were given over to reading in the classroom. For the most part, however, the reading was done voluntarily outside of school. No record exists of a great deal of the reading, because reports were not required. However, some reports were made for credit, and a comparison of the total number of books reported in 1936 and 1937 with those in 1937 and 1938 for 72 7th and 8th grade pupils for whom records were kept in both years, reveals that whereas 681 required books were reported in 1936 and 1937, 1213 books were voluntarily reported in 1937 and 1938.

The unit method of instruction was used as a stimulus to broader reading. A unit in the modern drama consuming about four weeks' time led a class of 32 students to read voluntarily 399 plays, the majority of them three-act plays. This is an average of 12 plays per pupil, more outside reading than is done in a full year in many high school courses. The plays ranged all the way from "Victoria Regina" and George Bernard Shaw to "I'd Rather Be Right". Individual differences in vocabulary strength, natural interests, and abilities were cared for in a natural way, the voluntary choice under guidance of reading material.

No artificial stimulus was used to produce this wide reading, and no complete records were kept of it. The books were in the classroom; they were attractive and carefully chosen, and the children read eagerly, establishing the habit of the enjoyment of books at the same time that they were building toward high scores on tests. Often a full hour was devoted to silent reading with the teacher listening to informal reports on reading, and talking about books or watching the habits of the class and speaking to individuals showing symptoms of poor reading habits.

RESULTS

In May, Form B of the Iowa Silent Reading Tests was given to the same students who took the test in October. The same persons administered the tests, and everything possible was done to make the results as accurate as possible.

An analysis of the scores indicates that in comprehension, one section gained two years and two months in six months' time; twelve sections gained from 1 to 2 years; six sections gained from 6 months to one year; three sections gained less than 6 months; one section made no gain, because there was no opportunity to gain since they had achieved the top score in October. The gains in comprehension ranged from 2.2 to .25 (2 years, 2 months to 2½ months) in 6 months' time.

In speed, six sections gained from 2 to 4 years in 6 months' time; 9 sections gained from 1 to 2 years; 5 sections gained less than 6 months; one section apparently lost in speed, but they were interrupted while taking the speed test by the accidental entrance of another class into the room; one section had no opportunity to gain, since they had achieved the top score in October. Gains ranged from 4.4 to minus 1.3 (4 years and 4 months to minus 1 year and 3 months). An average of the median scores for the 23 sections gives an average gain in comprehension of 1.10 and in speed of 1.7. In comprehension the gain was nearly double the normal gain of 6 months, and in speed it was more than double.

In 6 months' time it was not possible, of course, to raise the reading ability of all students to optimum practicable levels of proficiency. Some students will never read so well as others. Factors of intelligence, and physical and emotional setup defeat corrective training no matter how long continued. However, it is clear that with very simple devices immense

TABLE III

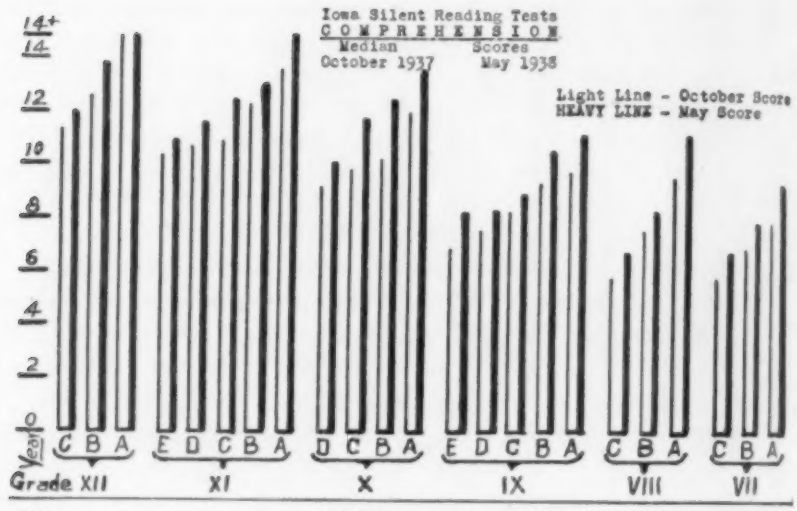
RESULTS OF MAY TESTS

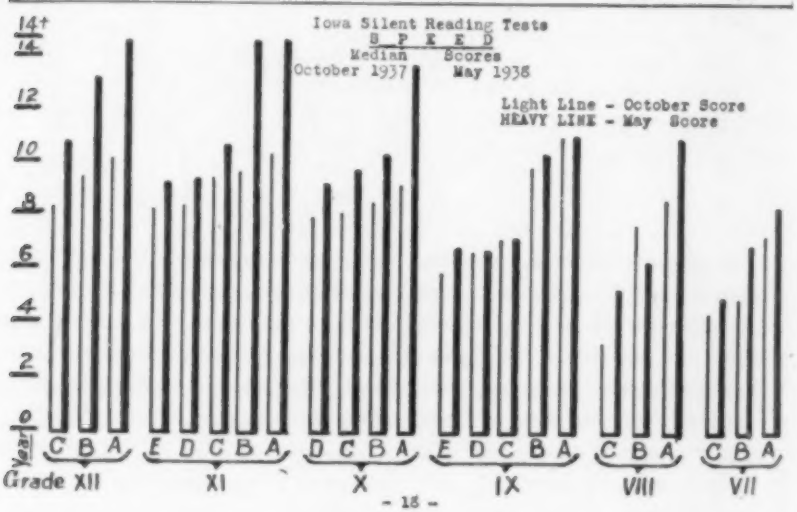
Grade	Norm	COMPREHENSION		SPEED	
		May Score	Oct. to May Gain	May Score	Oct. to May Gain
7 A	7.8	9.2	1.5	8.5	1.1
7 B	7.8	7.7	1.0	7.0	2.0
7 C	7.8	6.65	.85	5.0	.5
8 A	8.8	10.9	1.25	11.0	2.25
8 B	8.8	8.1	.5	6.55	Minus 1.3
8 C	8.8	6.8	.9	5.4	1.7
9 A	9.8	11. plus	1.75 plus	11. plus	----
9 B	9.8	10.5	1.2	10.5	.5
9 C	9.8	8.9	.6	7.4	----
9 D	9.8	8.4	.8	6.9	----
9 E	9.8	8.3	1.2	7.0	1.0
10 A	10.8	13.5	1.6	14.0	4.4
10 B	10.8	12.4	2.2	10.6	1.7
10 C	10.8	11.7	1.9	9.9	1.4
10 D	10.8	10.0	1.6	9.6	1.3
11 A	11.8	14. plus	1. plus	14. plus	3.9
11 B	11.8	12.9	.6	14. plus	4.1
11 C	11.8	12.4	1.5	10.9	1.3
11 D	11.8	11.4	.6	9.6	1.1
11 E	11.8	10.8	.25	9.4	1.1
12 A	12.8	14. plus	----	14. plus	4.1
12 B	12.8	13.75	1.05	13.4	3.8
12 C	12.8	11.9	.4	10.9	2.4

strides may be taken in the direction of making students aware of their problems, awakening an interest in reading for pleasure, and in some degree solving the 'reading problem' which, while it is complicated, is not so baffling as many of the discussions of the problem may sound.

EXPENSE

The bugbear of the budget deters many superintendents from approaching any reading program. As a final word of encouragement, it may be said that the cost of such a program is trifling compared with the immense gains in time and effort. With the program as outlined above there is no expenditure for extra personnel; English teachers can carry most of the extra burden and in the end they will be delighted to have done so, for they, perhaps more than any other teachers in the system, will reap almost unbelievably rich benefits in increased proficiency and interest in their work. The cost of equipment is very slight. Funds ordinarily used for the purchase of sets of books can be diverted into the purchase of classroom libraries which will stimulate wide reading.


Iowa Silent Reading Tests
COMPREHENSION
Median Scores
October 1937 May 1938
Light Line - October Score
HEAVY LINE - May Score
14+
14
12
10
8
6
4
2
0
Year
C B A
E D C B A
D C B A
E D C B A
C B A
C B A
Grade XII
XI
X
IX
VIII
VII


Iowa Silent Reading Tests
SPEED
Median Scores
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Light Line - October Score
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14+
14
12
10
8
6
4
2
0
Year
C B A
E D C B A
D C B A
E D C B A
C B A
C B A
Grade XII
XI
X
IX
VIII
VII

The average anthology of literature and poetry costs $1.50 per book. These anthologies are written for a definite reading age or level. The average high-school class of 30 pupils varies in reading age from the 5th grade to the 12th. Thus, it will be seen that 30 copies of an anthology will not fit the reading abilities of the entire class. The $45.00 which would be spent for this anthology expended for a collection of books of various reading levels would purchase from thirty to forty excellent books—autobiography, biography, historical novels, poetry, fiction, and put a different book in the hands of every pupil. If the pupils are permitted to give oral reports of the books which they have read, they have an audience, because other members of the class have not read the same book. These reports stimulate the other members of the class to read several books. Some members read the entire thirty books during one year, but every pupil reads at least ten, and if the teacher has made a wise selection, the group will be exposed to a wide reading range and interest.

The cost of a testing program will depend upon the type and the number of tests used. The authors of this article feel that a testing program well repays its cost because of the way it acts as a stimulus to teacher and pupil. If there is no goal to race toward, the contestants may lag. The Iowa tests used in this experiment cost $.056 per test.

The special drill exercises needed for development of speed constitute the only really necessary *extra* expenditure, and these may be purchased for approximately six cents per pupil if a plan of rotation is conceived whereby the books are in constant use. For a high school of 650 students, six sets of 30 each of books containing silent reading drills will furnish adequate material for 6 months' corrective training. The Hall–McCreary series used in this experiment cost 5½ cents per pupil. The program is so planned that these six sets of books are in constant circulation among the English classes. Since they are small, paper-bound books, they can easily be carried from room to room; and hence a small number of books are made to serve a large number of students.

Surely an average gain of about a year and a half in reading age is a bargain at six cents!

SKILLS RELATED TO THE ABILITY TO READ HISTORY AND SCIENCE

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Editor's note: The author raises a question about the concept of general reading ability and offers data that seems to indicate history and science at the ninth grade level present special reading problems.

INTRODUCTION

THE statement that "every teacher should be, to a significant extent, a teacher of reading" has gained wide recognition and has led to considerable controversy.[1] The statement assumes that reading instruction must continue beyond the reading period and beyond the elementary school. If this is true, teachers in the content fields must sacrifice time formerly spent on their content subjects to instruction on the reading abilities essential to effective reading of the materials employed in these subjects. If every teacher must teach reading, it follows that the reading requirements of the materials in a given content field are, at least in some respects, unique to that field, and that these more or less unique skills would be more effectively taught by a person well acquainted with the materials and requirements of the content field. In other words, if the teacher of science in the ninth grade must teach the ability to read science materials, there must be reading skills essential to effective reading of science that are not essential to good reading of literature, history or other content materials. If the skills all had general application it seems that they could be well-taught in a general reading period.

PROBLEM

The purpose of this study was to determine the relationships among ninth-grade pupils, between certain study and reading skills and reading comprehension of scientific and historical materials. An attempt was made to (1) study the relationship between each of the measured reading and study skills and reading comprehension of historical material; (2) to determine the relationship between each of the measured reading and study skills and reading comprehension with scientific material; (3) to better understand the relationship between both scientific and historical reading comprehension and a sampling of vocabulary from diverse fields; (4) to further explore the

[1] National Society for the Study of Education, Thirty-Sixth Yearbook, *The Teaching of Reading: A Second Report*, p. 6.

relationship between a vocabulary of words frequently found in historical and scientific materials and reading comprehensions in history and science. In addition, this investigation attempted (5) to determine, when relationships were discovered, the area of the population responsible for these relationships.

The forementioned specific purposes were means to more fundamental purposes. This study attempted to contribute to a more complete understanding of the relationships involved in the developmental reading process, and thus to aid in the determination of a better reading program in the public schools.

STUDENT POPULATION AND TESTS USED

The entire first term ninth-grade population of the Central Junior High School in Kansas City, Missouri, provided the student population. A total of 380 complete cases resulted. This group seemed to be representative with respect to such factors of random sampling as socio-economic status, intelligence, reading ability, achievement, and educational experience. The nature of the statistical techniques employed in this study render unimportant possible selection with respect to relatively major factors of representativeness such as mental age and ability to read literature, science, and history.

Information was obtained with each of the tests in Table I for each of the 380 cases. These tests were administered under uniform testing conditions. No more than three weeks elapsed between the administration of any two tests.

METHOD

The statistical method employed in this investigation was a generalized approach to the matched-control type of research where the significance of a difference between means is found. Palmer Johnson and J. Neyman were responsible for the development of this generalized and more efficient method of analysis.[2] Good and poor groups[3] of readers with science and history

[2] Palmer O. Johnson and J. Neyman, *Tests of Certain Linear Hypotheses and Their Application to Some Educational Problems*, London, England: Department of Statistics, University of London, University College, June 1936.

[3] (a) Kelley has found that the upper and lower twenty-seven percent offers the most rigorous and efficient division. This division was closely approximated in the present study.

(b) Truman L. Kelley, "The Selection of Upper and Lower Groups for Validation of Test Items," *Journal of Educational Psychology*, XXX (January, 1939), pp. 17–24.

TABLE I

INFORMATION CONCERNING TESTS USED

Name of Test	Author	Date	Reliability Coefficient[a]	Admin. Time	Publisher
Iowa Every-Pupil Tests of Basic Skills Test A: Silent Reading Comprehension	Horn, Ernest; Mc Broom, M.; Spitzer, H. F.; Greene, H. A.; Knight, F. B.;	1939	.90	Approx. 85 min. (or two 45 min. periods)	Bureau of Educational Research and Service, Extension Division, University of Iowa, Iowa City, Iowa.
Part I Paragraph Comprehension			.67		
Part II Understanding of Details			.80		
Part III Organization of Ideas			.70		
Part IV Grasp of Total Meaning			.57		
Total—Parts I to IV			.90		
Part V Vocabulary			.91		
Iowa Every-Pupil Tests of Basic Skills Test B: Basic Study Skills	Same as above	1939	.95	Approx. 90 min. (or two 45 min. periods)	Same as above.
Part I Maps			.79		
Part II Graphs, Charts			.79		
Part III References			.87		
Part IV Index			.84		
Part V Dictionary			.83		
Total			.95		
Reading Scales in Literature	Van Wagenen, M. J.	1922[b] (1939)	+ P. E. 3 to 3.5 C—score points	Approx. 45 min.	Educational Test Bureau, Educational Publishers, Inc. Minneapolis, Minn.
Reading Scales in Science	Van Wagenen, M. J.	1938	Same as above	Approx. 45 min.	Same as above
Reading Scales in History	Van Wagenen, M. J.	1938	Same as above	Approx. 45 min.	Same as above
Meaning of Words Used in Science	Swenson, E. J.	1938	.79	Approx. 20 min.	Unpublished, E. J. Swenson, College of Education, University of Minnesota, Minneapolis
Meaning of Words Used in History	Shores, J. H.	1938	.72	Approx. 20 min.	Unpublished, J. H. Shores, College of Education, University of Minnesota, Minneapolis
California Test of Mental Maturity—Advanced Battery (Total Score)	Sullivan, E. T. Clark, W. W. Tiege, E. W.	1937	.95	Two periods of approx. 45 to 50 min. each	California Test Bureau, 3636 Beverly Blvd., Los Angeles, California

[a] Reliability coefficients for the Iowa tests and for the Van Wagenen tests were secured from the authors.

[b] Published in 1922. Published in 1939 with changes from 1922 publication only in format and scoring method. On advice of the author the 1922 tests and 1939 scoring methods were used.

materials were compared for differences in mean ability in each of the measured skills. Before each comparison the good and poor groups were rendered equivalent in mental age and ability to read literature. It was felt that with mental age uncontrolled, differences in level of mental development might account for differences between good and poor history or science readers in the various skills. Ability to read literature was controlled in order that discovered differences could not be explained by so-called factors of "general reading ability."

Since the difference in effects of the basic matching characters (mental age and ability to read literature) were determined before each comparison by the regression of the skill on the matching characters, the need for individual matching of cases disappeared. Hence, the entire populations of good and poor readers of science and history were employed without the usual loss of cases in matching. The generalized method employed in this study offered still another advantage over the usual "matched-control" approach to research. It allowed not only the determination of significant differences between the good and poor science and history readers in separate skills, but also enabled determination of the section of the population with respect to the basic matching characters where these differences were significant. Through the use of this concept known as "regions of significance", limits of mental age and ability to read literature may be set whereby it is possible to say that the discovered difference is a significant one within these limits. That is, a significant difference may be found between good and poor history readers in ability to use the index. Through the use of "regions of significance" it is found that this difference is a reliable one only for those pupils with average mental age and average to slightly superior ability to read literature.

RESULTS

The results of this investigation are summarized in Table II. When enumerated, they are as follows:

1. In the first analysis, groups of good and poor science readers were compared for significant differences in their mean ability in each of the measured skills. The ability to read science was found significantly related to the following skills and abilities: (1) history comprehension, (2) science vocabulary knowledge, (3) general vocabulary knowledge, (4) ability to read graphs, charts, and tables, (5) understanding of details, and (6) the

TABLE II

RELATIONSHIPS BETWEEN ABILITY TO READ SCIENCE AND HISTORY AND VARIOUS READING ABILITIES[4]

Abilities	Science Relationships			History Relationships		
	Approximate percentiles in Region of Significance			Approximate percentiles in Region of Significance		
	Mental Age	Literature Comprehension	Level of Significance	Mental Age	Literature Comprehension	Level of Significance
Science Comprehension	0—100	0—100	Upper	10— 95	10— 85	Upper
History Comprehension	30—100	25—100	Upper	0—100	0—100	Upper
Science Vocabulary	10—100	10—100	Upper	0— 95	0— 85	Upper
History Vocabulary	60—100	45—100	Lower	15—100	15—100	Upper
General Vocabulary	35— 85	40— 80	Upper	15—100	5— 95	Upper
Understanding of Details	30— 90	40— 90	Upper	0— 95	0— 85	Upper
Organization of Ideas	10— 90	45—100	Lower	10— 80	10— 70	Upper
Grasp of Total Meaning	----------	----------	None	0— 55	0— 45	Upper
Paragraph Comprehension	----------	----------	None	0— 75	15— 90	Upper
Total Score: Silent Reading Comprehension	30— 65	45— 80	Upper	0— 90	0— 85	Upper
Reading Graphs, Charts, and Tables	0— 75	0— 75	Upper	0— 80	0— 75	Upper
Use of Basic References	----------	----------	None	10— 70	30— 90	Upper
Use of Index	----------	----------	None	30— 70	40— 75	Upper
Use of Dictionary	----------	----------	None	0—100	0—100	Upper
Comprehension of Maps	0— 60	30— 80	Lower	----------	----------	None
Total Score: Basic Study Skills	----------	----------	None	5—100	0—100	Upper

[4] Table II is read as follows: The relationship between understanding of details and ability to read science is reliably established at the upper (.01) level of significance for those pupils whose coordinates in mental age and literature comprehension locate points between the thirtieth and ninetieth percentiles in mental age and also between the fortieth and ninetieth percentiles in literature comprehension. Understanding of details is related at the upper level of significance to ability to read history for all pupils except those in the upper five percent of the total mental age distribution and also in the upper fifteen percent of the total distribution in literature comprehension.

total score on the measured skills of silent reading comprehension. The relationship between ability to read science materials and the three following skills approached significance: (1) history vocabulary knowledge, (2) facility in the organization of ideas, and (3) ability to comprehend maps.

2. The ability to read history was found significantly related to all of the measured skills and abilities with the exception of ability to comprehend maps. Factors of mental age and ability to read literature were again controlled. History reading ability was significantly related to the following skills: (1) science comprehension, (2) history vocabulary, (3) general vocabulary, (4) science vocabulary, (5) paragraph comprehension, (6) grasp of the total meaning of a reading passage, (7) organization of ideas, (8) understanding of details, (9) the total score on the measured skills of silent reading comprehension, (10) reading of graphs, charts and tables, (11) use

of the index, (12) use of the dictionary, (13) use of basic references, and (14) the total score of the measured basic study skills.

3. All of the skills not found significantly related to ability to read science materials were significantly related to ability to read historical materials. These skills are: (1) paragraph comprehension, (2) grasp of the total meaning of a reading passage, (3) use of the index, (4) use of the dictionary, (5) use of basic references, (6) the total score of the measured basic study skills, (7) history vocabulary knowledge, and (8) organization of ideas. The relationship of the latter two abilities to history comprehension is firmly established, while their relationship to science comprehension only approaches significance.

4. The only measured skill not shown to hold a significant relationship to history reading ability, comprehension of maps, approached a significant relationship to science reading ability.

5. Several of the skills and abilities were found significantly related to ability to read both scientific and historical materials. These are as follows: (1) science comprehension, (2) history comprehension, (3) science vocabulary, (4) general vocabulary, (5) reading graphs, charts, and tables, (6) understanding of details, and (7) the total score of the measured skills of silent reading comprehension.

6. In general, the areas of the student population, with respect to the basic matching criteria (mental age and literature comprehension), wherein the established relationships may be said to be significant, are larger with the history reading relationships than with the science. That is, the relationships between history reading ability and the various skills seem to be reliably established for more students than do the science relationships.

7. The location of the areas of relationship between science reading ability and the various skills shown to be related to ability to read science indicates that these relationships are generally reliable for all students with average or superior, but not very superior, mental age and ability to read literature. The significant relationships between ability to read historical materials and the various skills tend to be reliable for all students except those with very high mental age or very superior ability to read literature. Thus, with few exceptions, superiority in ability to read science must be accompanied by average or superior mental age and ability to read literature before these better science readers are specifically and reliably better in certain related skills. On the other hand, with few exceptions, superiority in

ability to read history indicates superior ability in the related skills for all students who do not have exceptionally high mental age and ability to read literature.

8. In no instance was a significant negative relationship discovered between ability to read science or history and a particular skill. That is, there was no comparison where the poorer readers of science or history were significantly superior to the better science or history readers in a particular ability. The poorer readers of science tended to be slightly superior to the better science readers in use of the index and use of references but these negative relationships fell far short of statistical significance.

CONCLUSIONS

The analysis of the data in the present study suggests the following conclusions:

1. By the time students have reached the ninth grade their reading proficiency is to a considerable extent specific to the content field in which the reading is done. To speak of "general reading ability" of ninth-grade students, without description of the content field in which the reading is done, is unwarranted in overlooking this specificity. The ability to read scientific and historical materials holds unique and different relationships to a number of reading skills. Ability to read effectively in the materials of science or history probably requires combinations of skills either not related to or not as closely related to ability to read literature as these skills are to ability to read science and history.

2. Since the results of this study offer rather conclusive evidence in refutation of the concept of a general reading ability in the ninth grade, tests devised to measure reading ability at this level should take steps to control the type of materials with which the measurement is taken. The fact that various reading abilities tend to be associated with the reading of one type of content reading material does not assure that a similar association will hold with materials of another content field. Certain reading skills are significantly related to ability to read history and science materials in a manner not explained by ability to read literature.

3. The skills measured in this study seem, in general, to be more reliably related to ability to read historical materials than to ability to read scientific materials. With a single exception, these skills are concomitants of ability to read history. The unproved implication here is that the teaching of these

skills should be, at least in part, the responsibility of teachers of history. Implications such as this one are subject to change with change in the nature of the instructional program. Under different instruction the relationship between these skills and ability to read history might be altered considerably.

4. Certain of the measured reading abilities were found significantly related to ability to read history materials and not to ability to read science materials. The implication here, while needing further substantiation through additional research, is that science teachers should probably be freed from specific responsibility for development of these skills. Again, this implication might change with change in the instructional program. The only skill tending to show significant relationship to science and not history reading ability (comprehension of maps) was established at a level of doubtful significance and therefore does not warrant dependable generalizations.

5. A number of the measured abilities present significant relationships to both ability to read scientific and historical materials in a manner not explained by ability to read literature. These skills seem to be specific concomitants of both ability to read science and history. Such findings seem to imply that since the ability to read science and history have a common close relationship to certain skills, the teaching of these skills should probably be the joint responsibility of at least the teachers of science and history. This implication needs further substantiation, and is subject to change with change in the instructional program. Such implications are also subject to practical application. For example, even though science vocabulary knowledge is significantly related to both ability to read science and history, practical considerations would tend to make the teaching of this skill largely the responsibility of the science teacher.

6. The skills and abilities measured in this study tend to divide themselves into several groups. There are those concerned with power of silent reading comprehension in the materials of several content fields, measures of specific and general vocabulary knowledges, skills concerned with the general significance or general meaning of a reading passage, skills where very exacting reading is required, and skills employed in the location of information. The skills tending to show a specific relationship to comprehension of scientific materials are those calling for power of reading comprehension, vocabulary knowledge, or a very exact type of reading. There was no established relationship between science reading ability and the skills which require facility in either location of information or ability to comprehend

the general meaning of a reading passage. On the other hand each of these groups of reading abilities tended to be a concomitant of ability to read historical materials.

The good readers of science tend to be also superior in more detailed and exacting skills of reading. The good history readers tend to be also superior in all the measured types of reading responses. Neither of these trends is the resultant of ability with the type of reading required with literary materials.

7. In general, the size of the areas of relationship seem to suggest that the association between ability to read history and the various skills will be a reliable one for a larger percentage of ninth-grade students than will the established science reading relationships. The history relationships tend to be firmly established for wider ranges of values of mental age and ability to read literature.

8. The data present a noticeable trend for the relationships between history reading ability and the various skills found significantly related to history reading to be reliably established for all pupils except those with very superior mental age and ability to read literature. In contrast, the trend with science reading ability and the related skills, was for these relationships to be firmly established for pupils with average or superior, but not extremely high, values of mental age and literature comprehension.

While the analysis of the data only presents and does not explain this condition, an hypothesis as to its meaning may be offered. Assuming that the relationship between ability to read history and a particular skill is a causal one, it may be said that ability in the skill is important for good readers of history. However, it may be that ability in the skill beyond that normally achieved by pupils of high mental age and very superior ability to read literature is not necessary to efficient reading of history. Good reading ability in literature and high mental age, with their accompanying excellence in the particular skill, may be adequate for effective reading of history. Hence, additional development of the skill at this level would not be functional in discriminating good from poor readers of history.

Reasoning in like manner, a higher excellence in the particular skill is required in science than in history reading before the skill becomes a significant factor to good reading of science. It has been hypothesized that as values of mental age and ability to read literature are higher, there is an accompanying increase in the amount of the skill. Thus, it may be that only

those pupils with average or superior mental age and ability to read literature have enough of the skill necessary for effective reading of science. However, ability in the skill normally achieved by pupils of extremely high mental age and very superior ability to read literature may be adequate for effective reading of science, and any additional development of the skill for these pupils would not function to discriminate good from poor readers of science.

9. The fact that ninth-grade teachers should be concerned with the teaching of reading in the content materials of science and history is plainly indicated. The data suggest some of the skills that it might be well to teach in these subjects. Further research is needed to substantiate this contention.

10. These data strengthen the viewpoint that reading in the ninth-grade is neither a simple nor general ability. Reading at this level shows varying degrees of relationship to several aspects of reading skill, depending at least in part upon the content field in which the reading is done.

PROBLEMS SUGGESTED FOR FURTHER STUDY

The results of this investigation indicate that study of the relationships between reading and study skills and reading proficiency in materials of various content fields should be a fruitful field for further research. Studies similar to the present one should be conducted in additional grades, with the reading materials of other content fields, and with additional measures of reading and study skills. It would be interesting to know the effects of reading and working rate on these relationships. The effects of varied instructional programs and methods on these relationships should also be of value.

Teachers in the content fields should conduct controlled studies to determine the effect on both achievement and reading ability in the materials of a given content field of specific instruction in the skills found related to ability to read the materials of that field. It should be valuable in studies of this nature to employ several control groups. In one group the teacher would continue in traditional manner with little specific instruction in reading. In another group an attempt would be made to teach all work-type reading skills. In a third control group, the teacher would attempt to teach those skills believed to be important to efficient reading ability and achievement in the particular subject.

Studies should be made of the effects of difficulty of materials, interest and motivation, reader's purpose, and meaning background on reading proficiency with the materials of the various content fields.

SEX DIFFERENCES IN READING ACHIEVEMENT

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Editor's note: The author reports sex differences in reading ability and reading readiness. The causes of these differences and methods of instruction need further study.

VARIOUS educators and students of children have noted that girls tend to make more rapid progress than boys in the elementary schools. Because this difference has been apparent for some time in the first grades of the city schools of Phoenix, Arizona some reseach was conducted during the school year of 1939–40 to get definite information on the following questions: 1. Are there sex differences in reading readiness and achievement? 2. What is the correlation between various measures of readiness? 3. What correlation is there between prognostic measures and achievement as measured by a standardized reading test? 4. Are sex differences in readiness and achievement apparent when boys and girls are paired on the basis of mental age?

Educators agree that there are certain qualities of physical, mental, emotional, and social maturity which make one child ready for reading and another one unready. To determine what degree of maturity the English-speaking entrants into first grade in the fall of 1939 had reached, first-grade teachers in the Phoenix Schools used the first two weeks of school for observation of individuals and informal readiness tests. The combined results of tests and observation were indicated for each child on a rating sheet at the end of two weeks.

To supplement the teachers' judgment, the Kuhlmann–Anderson Intelligence Test and the Monroe Aptitude Test were administered during the first two weeks in groups of eight to ten by one of three different people experienced in testing. The results were not known to the teachers until the close of the second week of school, so that they would not be influenced in making their ratings. At the end of that period, teacher, principal, and supervisor met and grouped the children according to the various prognoses. If there were three first-grade groups in the school, two rooms were left as they were, as nearly as possible, moving to the third room only the children who were judged to be least ready for reading and replacing them with the highest rating children from the third room. If the school had only one

room of first-grade children, groupings depending on readiness were made within the room. The attempt was made to keep the readiness group as small as possible so that every opportunity for individual help could be utilized.

One month before the close of the year, the Gates Primary Reading Tests Form 1 were administered to all of the children regardless of group. The results and the grades, given by the teachers up to that time, were examined and correlations computed between them and the various measures of prognosis. Differences between the whole group of 216 boys and the whole group of 237 girls were noted.

To check further on sex differences, as many boys and girls as possible were paired on bases explained later in this article. Differences between boys and girls in the resulting 100 pairs were noted in reading aptitude, picture scores (Goodenough Picture Test), teacher prognosis, teacher grades, and achievement in reading.

RESULTS OF MEASURES OF PREDICTION AND ACHIEVEMENT

The critical ratios found in Table II show that in five of the six measures of prediction the girls were superior to a degree sufficient to be statistically significant (4 times P.E.). The small difference in means of chronological ages would be expected because entrance age is controlled by law.

When this study was made children were graded each six weeks on a five point scale, 1, 2, 3, 4, and 5. Grades were given score rankings for a composite score according to the values indicated here.

Grade	Score
1	5
2	4
3	3
4	2
5	1
R (Readiness Group)	0

The scores were used in the following way. Suppose that John, a child who spent the first semester in the Readiness Group, had received grades of R, R, R, 3, 3 for the year, he would have a composite score of 0, 0, 0, 3, 3, or 6 for the year. (Only the first five periods of the year were considered in this investigation.) It will be noted in Table III that the girls

TABLE II

DIFFERENCES BETWEEN SEXES IN PREDICTIVE MEASURES*

	C. A.	M. A.	I. Q.	Drawing	Teacher Rating	Monroe Aptitude Test
Range						
Boys	66–99	51–89	64–120	0–12	1–13	6–92
Girls	65–97	54–89	70–132	0–12	1–13	2–96
Mean						
Boys	75. 42 ± .23	73. 85 ± .34	97. 23 ± .50	5. 13 ± .13	6. 87 ± .13	55. 00 ± .89
Girls	74. 91 ± .22	76. 47 ± .42	102. 30 ± .44	6. 70 ± .13	8. 07 ± .12	62. 05 ± .86
Diff.	.51B	2. 62G	5. 07G	1. 57G	1. 20G	7. 05G
PE diff.	.32	.54	.67	.18	.18	1. 24
Critical ratio	1. 59	4. 85	7. 57	8. 72	6. 68	5. 68
SD						
Boys	5. 10 ± .17	7. 49 ± .24	10. 95 ± .35	2. 92 ± .09	2. 81 ± .09	19. 35 ± .63
Girls	5. 1 ± .16	6. 54 ± .30	10. 1 ± .31	3. 02 ± .09	2. 75 ± .08	19. 65 ± .61
Diff.	.0	.95G	.85B	.10B	.06B	.30B
PE diff.	.25	.38	.47	.13	.12	.88
Critical ratio	0	2. 5	1. 79	.77	.5	.34

* Throughout this study a difference in favor of the boys will be indicated in the tables by the letter B beside the figure. G will be used to indicate a difference in favor of the girls.

received a mean score of 2.62 above the boys which was enough to be statistically significant.

Between April 15 and 22, all children were given the Gates Primary Reading Test, Form 1. The three reading grade norms were averaged to give a composite reading grade for each child. Table III shows that girls were .43 (which means approximately four school months) superior to the boys in mean score and .07 more variable. The difference in means had a significance ratio (14.33) which was high enough to make us very sure that chance alone could not have accounted for it.

THE VALUE OF THE PREDICTIVE MEASURES

Since the Monroe Aptitude Test was constructed as a special measure of readiness, it was used as the criterion for correlation with each of the other predictive measures. In Table IV the coefficient of correlation for the scores on the aptitude test and chronological ages for the boys ($-.21 \pm .05$) could scarcely be said to be highly significant since it barely met the require-

TABLE III

DIFFERENCES BETWEEN SEXES IN MEASURES OF ACHIEVEMENT

	Teacher's Grade Scores	Composite Grade Scores
Range		
Boys	0–24	1.25–3.08
Girls	0–25	1.25–3.44
Mean		
Boys	12.62 ± .12	2.08 ± .02
Girls	15.24 ± .23	2.51 ± .02
Diff.	2.62 G	.43 G
PE diff.	.26	.03
Critical Ratio	10.08	14.33
SD		
Boys	2.71 ± .09	.42 ± .01
Girls	5.24 ± .16	.49 ± .01
Diff.	2.53 G	.07 B
PE diff.	.18	.01
Critical Ratio	1.41	7.00

ment necessary for statistical significance. For the girls the correlation for the same variables was $-.27 \pm .04$ which was significant. The correlations between scores of the Monroe Aptitude Test and mental ages for both boys and girls had a relationship with their respective probable errors which assures us that the true correlations between these variables were greater than zero. The same was true of the correlation between intelligence quotients and aptitude scores. Slight differences in the sexes were apparent but were so small as to have been considered of little consequence statistically as shown by the critical ratio in each case. The correlations between the criterion and the picture scores and teacher ratings for both boys and girls were statistically significant indicating that the true correlations for the variables in question are greater than zero. The differences between boys and girls in both correlations were not significant statistically.

The seemingly low coefficients shown in Table IV may be interpreted to mean that the individual predictive measures have considerable variation. Being high in one measure does not assure being equally high in score in any other prognostic measure. According to the criterion of statistical significance previously stated, the various measures of prediction fall in this

TABLE IV

CORRELATION BETWEEN MONROE APTITUDE AND OTHER MEASURES OF PREDICTION

	C. A.	M. A.	I. Q.	Picture Scores	Teacher Rating
Boys	—.21 ± .05	.57 ± .03	.66 ± .03	.45 ± .03	.52 ± .03
Girls	—.27 ± .04	.53 ± .03	.63 ± .03	.35 ± .04	.50 ± .03
Diff.	.06 G	.04 B	.03 B	.02 B	.02 B
PE diff.	.06	.04	.04	.03	.03
Critical ratio	1.00	1.00	1.00	2.00	.67

order from highest to lowest in point of correlation with the scores on the Monroe Aptitude Test: intelligence quotient, mental age, teacher rating, picture drawing test, and chronological age.

The value of a measure of prognosis is determined by the degree of correlation with a measure of achievement in the skill in which the former attempts to predict success.

Since the Gates Primary Reading Tests were used in this study as a standardized measure of achievement, a composite score for the three types of the tests was used as the criterion for predictive value of chronological age, mental age, intelligence quotient, teacher rating, and Monroe Aptitude Test. The most predictive measure is indicated by the highest correlations if those correlations are also significant statistically. Table V shows that of these two criteria, intelligence quotients seemed to be the best predictive measures for both boys and girls. For the boys, mental ages seemed to have

TABLE V

CORRELATIONS BETWEEN MEASURES OF PREDICTION AND COMPOSITE SCORES ON GATES TEST

	Chronological Age	Mental Age	Intelligence Quotient	Monroe Aptitude	Teacher Rating
Boys	—.04 ± .05	.45 ± .03	.49 ± .03	.36 ± .04	.37 ± .03
Girls	—.13 ± .04	.5 ± .03	.51 ± .03	.43 ± .04	.35 ± .04
Diff.	.09 G	.05 G	.02 G	.07 G	.12 B
PE diff.	.06	.04	.04	.06	.12
Critical ratio	1.05	1.25	.5	1.17	1.00

practically the same predictive value as intelligence quotients while for the girls, teacher rating was second high in predictive value. Next in order in prognostic value were the teacher ratings for the boys and the scores on the Monroe Aptitude Test for the girls. With the exception of chronological ages which had practically no value for prognosis of reading achievement for either sex, the lowest in point of predictiveness was Monroe Aptitude for the boys and teacher rating for the girls.

It appears from the evidence that the different measures were not highly predictive of later success in reading. However, if the correlation between a measure of prognosis and a measure of achievement administered eight months later, were exceptionally high, the whole plan of teaching in the first grade would be definitely arranged as soon as the judgments of readiness were completed and certain children would be designated for success and others for failure. The readiness program plans only for success, but success at each child's level by attempting to prepare those unready for the reading situation and to introduce them to it when success can be achieved. A few weeks or months in a small group with an understanding teacher helps some pupils to progress by the end of the year as far as many others who seem more ready for reading at the beginning of the year. In this connection it is interesting to note that of forty-nine boys who made scores below forty (the point below which there is little expectancy of success in reading) on the Monroe Aptitude Test and were in readiness groups all or part of the year, twenty achieved at the end of the year a composite reading grade of 1.95 or more on the Gates Reading Tests. With one exception, these boys had intelligence quotients of ninety or above. A similar illustration could be given for the girls.

Although these same boys and girls might have made the same progress in a group in which no special attention was given to their lack of readiness, it seems reasonable to assume that their presence in the readiness group was a determining factor in their progress. This is an incentive for schools to provide administrative and instructional techniques suitable for beginning children who seem unready for reading.

SEX DIFFERENCES IN READINESS AND ACHIEVEMENT AS ASCERTAINED FROM ONE HUNDRED RELATED PAIRS OF BOYS AND GIRLS

This study has shown statistically that the group of 237 girls made mean scores which exceeded the mean scores made by the group of 216 boys

in all the measures of prediction except chronological age and in both of the measures of achievement. Since the girls made a mean score of $2.52 \pm .54$ higher than the boys in mental ages and $5.07 \pm .67$ higher in intelligence quotients it seems logical to question the significance of the differences in favor of the girls in the other measures since the girls appear to be somewhat brighter than the boys. It was a matter of conjecture as to what the differences between the sexes would be if boys and girls of the same mental ages and the same intelligence quotients were paired. Such a procedure is described in this section. The comparisons were made by two methods: first, an arbitrary counting method and second, a method using recognized statistical techniques for determining the reliability of a difference between related pairs.

The pairing was done on the basis of mental ages particularly, but no children were paired who were very different in chronological ages or intelligence quotients because of the inadvisability of pairing a "bright" child of five years and seven months with a "slow" child of seven years who may have the same mental age as the younger child. By using a continued membership in the same group as a control it was possible to equalize for the pair the effects of teacher zeal and skill on pupil achievement as well as skill in rating the children in readiness at the beginning of the year and in reading achievement at the end of the year. Social status and economic condition of the families from which the children came, days of attendance in kindergarten, and days of absence were also considered as much as the major controls would allow.

It was found possible to make one hundred pairs of which the members of forty pairs had the same mental age, the members of thirty-seven pairs differed by one month, the members of eighteen pairs differed by two months and the members of the other five pairs differed in their mental ages by three months.

In comparing scores for the two children within each pair on the various measures used in this study, great variety in degrees of difference was found. In any situation in this study or other studies it is logical to assume that a few points difference on a scale of one hundred points is probably explainable by chance, but even a few points difference on a twelve or thirteen point scale may be important. On the basis of this assumption, certain more or less arbitrary standards were set up in this study of pairs of

boys and girls. No attempt was made in this part of the study to show statistically that certain differences were significant.

The length of this article does not permit a full description of the arbitrary method used, but the conclusions drawn were that the girls were superior in more pairs than were the boys. Although this fact was apparent in the predictive measures, it was much more so in the achievement ratings. Not only did more girls excel in their pairs in the reading test but their degree of superiority was higher on an absolute basis than for the boys who excelled in their pairs.

The formula previously used in this study to compute the probable error of a difference in means is based upon the assumption that the samples involved were independent. But the one hundred pairs of boys and girls studied in this section would likely have scores more similar than in the case of the random pairing and the distribution of such scores would likely be cancelled. A proper way to evaluate the mean difference between the scores for the members of each pair and for the distribution of differences thus obtained to "determine whether or not the mean of the distribution (the mean difference) differs significantly from zero."[1]

"The data for the individuals in each pair were arranged in columns and the difference in each pair noted. The mean difference was computed by totaling the column of differences and dividing this sum by 100, the number of pairs. The standard deviation of these differences was computed by the use of the formula S. D. $=\sqrt{\frac{\Sigma x^2}{N} - M^2}$ as outlined by Lindquist. The probable error of the mean difference was computed by the use of the formula, $PE_M = \frac{.6745\sigma}{\sqrt{N}}$."

Applying the criterion of statistical significance set up earlier in this study (4 times PE) it will be seen from the table that mean difference for the predictive measures are not significant but they assure us of 69, 96, and 85 chances in 100 respectively that the true difference was in favor of the girls. The mean differences in favor of the girls in the two measures of achievement are statistically significant.

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[1] Lindquist, E. F., *Statistical Analysis in Educational Research.* (Chicago: Houghton Mifflin Company, 1940) 58–59.

TABLE VII

AMOUNT OF DIFFERENCE BETWEEN MEMBERS OF PAIRS IN MEASURES OF PREDICTION AND ACHIEVEMENT AS MEASURED BY A STATISTICAL METHOD

	Monroe Aptitude	Teacher Rating	Drawing Test	Gates Composite	Teacher Grade
Mean Difference	2.26 G	.64 G	.56 G	.17 G	1.45 G
PE_m =	1.49	.21	.26	.03	.34
Critical Ratio	1.52	3.05	2.15	5.67	4.20

The results of the comparisons of related pairs by the arbitrary counting method and the statistical method of determining the differences between pairs were in complete harmony. Differences between the members of the pairs were found to be in favor of the girls in every measure used. The measures of prediction showed less difference between the sexes in both methods of comparison than did the measures of achievement.

RESULTS AND CONCLUSION

From the data collected by the methods outlined, these results were obtained.

1. The final random samples consisted of 216 boys and 237 girls, none of whom were absent more than twenty days during the year.

2. Sex differences in favor of the girls great enough to have statistical significance were found between the random samples in mental ages, intelligence quotients, drawing test scores, teachers' ratings, and scores on the Monroe Aptitude Test.

3. Sex differences in measures of achievement were found in favor of the girls with critical ratios which showed the difference to be statistically significant.

4. The correlations between the scores on the Monroe Aptitude Test and the other measures of prediction were low but reliable. Mental ages and intelligence quotients had the highest correlations with the aptitude scores.

5. The criterion for determining the prognostic value of the measures of prediction was the composite reading grade score obtained from the Gates Primary Reading Tests. In predictive value the measures ranged in order from highest to lowest in the order shown in the following tabulation.

Boys	*Girls*
Intelligence Quotients	Intelligence Quotients
Teacher Ratings	Mental Ages
Mental Ages	Monroe Aptitude Scores
Monroe Aptitude Scores	Teacher Ratings
Chronological Ages	Chronological Ages

6. By pairing one hundred boys from the random sample with one hundred girls from the random sample on the basis of mental age primarily, sex differences with smaller critical ratios were found in the same measures as in the random samples. The lowest ratio for the related pairs gave a probability of 68 chances in 100 that the true difference was in favor of the girls. The next to the lowest ratio assured chances of 85 in 100 that the true difference was greater than zero. All of the others assured a probability of at least 96 chances in 100 or better that the true difference was in favor of the girls.

From this rather detailed study of sex differences in reading achievement certain generalizations may be drawn:

1. Administrators should plan procedures for determining differences in reading readiness and plan for procedures which will meet the needs of each of the children to assure optimum performance within the individual's capacity.

2. Teachers should plan techniques of instruction which provide for individual differences in readiness.

3. No single measure should be relied upon as a criterion of readiness and no measures should be considered absolute. All attitudes toward relative state of readiness and groupings should be tentative.

4. Further investigation should be conducted to determine the cause of sex differences: linguistic ability, rate of physiological development, appeal of the school situation in general, content of books, and teaching technique.

A FOLLOW-UP STUDY OF NON-READERS

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Editor's note: The authors present in the materials to follow the results of a systematic follow-up study of 33 non-readers. They conclude that the problem of youngsters was more than one of reading, at least superficially considered.

PURPOSE OF THE STUDY

EDUCATIONAL practice has tended to treat the non-reader[3] as a child possessing a specific disability which may, or may not, be conditioned by emotional, mental, or physical maladjustment (7). With the reading difficulty corrected, the assumption has been made that the child will then progress without further marked difficulty in his educational career. The findings of this study question this comfortable assumption through a follow-up record of 33 non-reading boys. They suggest that, in the majority of cases, non-reading may be merely the original expression of the child's inability to respond adequately to the average classroom instruction.

It is our purpose to follow the educational career of these 33 boys through the eight elementary school grades in order to determine: (1) the extent of educational assistance needed to remedy the original reading defect, (2) the amount and type of additional educational aid required, (3) the emotional maladjustments present when non-reading lessons began, and (4) the relation between these maladjustments and the need for additional educational aid.

THE GROUP DEFINED

The thirty-three boys included in this follow-up study attended the San Francisco Public Schools. Twenty-seven of them have graduated from high school; six are in high school at present. While going through school, the educational progress of these boys was more carefully watched than is possible in the average public school situation; so that whenever educational aid was needed to keep the child working at the level of his ability, this additional aid was given.

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[1] Formerly Psychologist at Homewood Terrace.

[2] Senior remedial teacher at Homewood Terrace during entire period covered by this study.

[3] The "non-reader" of this study is a public school boy whose reading accomplishment is seriously below the standard for his grade and/or mental ability.

These boys were living under the supervision of the Pacific Hebrew Orphanage and Home Society of San Francisco in their cottage plan orphanage (Homewood Terrace).[1] A psychologist, employed full-time on the institution staff, was charged with the responsibility for the mental health, educational achievement, and vocational guidance of the children under supervision. Working with her on problems of educational adjustment were from one to three teachers, specially trained in remedial teaching.

With the hearty cooperation of the public schools, those under-care children who needed educational assistance were permitted to report from the nearby elementary school for half-hour periods of corrective instruction. This corrective work continued through the summer vacation. It primarily involved assistance in reading and arithmetic, but was extended to other school subjects to care for the current needs of the child.

The educational progress of all under-care children was checked by the psychologist with each report card, with annual educational tests, and with such special tests as were indicated by individual needs. The diagnostic measurements used were diverse, and were appropriate to the age, grade placement, and ability of the child as well as to the problem presented. When combined with extensive mental, emotional and aptitude measurements, and with the contacts of daily living and recreation, this program led to an intimate knowledge of the mental abilities, emotional reactions, personality, and educational accomplishments of the children.

The remedial teaching program was an adjunct of the psychological program. Children were given special assistance when this was requested by their school teacher, when special tests indicated educational weaknesses, or as preventive measures when it was suspected that emotional instabilities or slight educational weaknesses might, in the future, cause difficulties in educational progress. The extent of the lessons varied with the individual need—from one half-hour lesson a week to daily one-hour lessons during the summer months. They lasted until, in the opinion of the special teacher, the immediate problem had been corrected. The flexibility of this initial period of aid is indicated by the range of from 44 one-half hours aid to 1371 half-hours aid given to the boys in this follow-up group.

Over the fourteen years in which the psychological and remedial program has functioned at Homewood Terrace, certain criteria developed in

[1] Dr. Samuel Langer, formerly Superintendent of Homewood Terrace, Mr. Benjamin Bonaparte, present Superintendent.

mphasis was placed on preventive in the result that in this group 64% ing before reaching the third grade. hool adjustments—attention, effort, stressed. Here the remedial teacher setting standards of conduct for these standards through conduct flexibility of the special teaching r so long a time as he needed it, st for him. Original daily lessons ... to one, two, or three lessons a week; might discontinue completely; or might be intensified during the summer vacation. Thus the teaching program shifted during the year as individual needs grew and were met. (4) By the time the 7th or 8th grades had been reached, it was assumed that sufficient adjustments had been made to enable the child to do the work of these grades satisfactorily. Difficulties were at times encountered, however, primarily in grammar and arithmetic, and an assistant remedial teacher functioned mainly to give this junior high-school aid. (5) No remedial aid was available for the senior high-school student because here his educational program was carefully adjusted in relation to his interests and his abilities.

From the records of these 14 years of remedial teaching, 33 boys fulfilled the conditions of this follow-up study. They were originally referred through weakness in reading. They had graduated from high school or had reached senior high school where remedial educational aid was not given. A complete record of remedial aid in subjects other than reading was available. Of this group, two had reached the limit of their educational achievement in the tenth grade and were placed in unskilled occupations. Twenty-five of the group had completed high school. The remaining six are now in high school. It is possible then to determine for this group the cause of the original reading difficulty, the time necessary to remedy this defect, and their subsequent educational progress.

Reading aid began for these 33 boys from the low first through the low sixth grades, as seen in Table I. The policy of Homewood Terrace to emphasize preventive in preference to remedial educational aid is reflected here. However, children were received in the orphanage to twelve years of age and some of these children proved to be non-readers.

TABLE I

GRADES AT WHICH REMEDIAL READING LESSONS BEGAN

Grade	No. of Boys
L 1	3
H 1	2
L 2	10
H 2	6
L 3	4
H 3	3
L 4	0
H 4	1
L 5	1
H 5	2
L 6	1
	33

TABLE II

AGE AT WHICH REMEDIAL READING LESSONS BEGAN

Age	No. of Boys
6	6
7	9
8	6
9	5
10	2
11	3
12	2
	33

The high second grade is the median grade at which lessons for reading weaknesses were begun. This was when the boys were, on the average, between 8 and 9 years of age, as indicated in Table II.

The Stanford–Binet Measurement of Intelligence (1916) was given to these boys on, or prior to, admission to Homewood Terrace, as a portion of the diagnostic measurements which preceded assignment for special teaching aid. This Binet measurement was repeated, on the average, once in two years thereafter. In one case there was a marked fluctuation of Binet I.Q. from 85 at age 7 (1916 revision) to 125 at age 17 (Revised, Form L). Since six of the ten Binet measurements given this boy clustered around 95, with range from 92–99, and his school progress was average, he is included in Table III as of average intelligence, I.Q. 95.

guiding this program. (1) Increasing emphasis was placed on preventive in preference to remedial instruction, with the result that in this group 64% of the boys were given assistance in reading before reaching the third grade. (2) The importance of stability of school adjustments—attention, effort, sociability, and good sportsmanship—was stressed. Here the remedial teacher cooperated with the classroom teacher in setting standards of conduct for the individual, and helping to maintain these standards through conduct reports and reward incentives. (3) The flexibility of the special teaching program assured the child remedial aid for so long a time as he needed it, and as intensive a schedule as seemed best for him. Original daily lessons might dwindle to one, two, or three lessons a week; might discontinue completely; or might be intensified during the summer vacation. Thus the teaching program shifted during the year as individual needs grew and were met. (4) By the time the 7th or 8th grades had been reached, it was assumed that sufficient adjustments had been made to enable the child to do the work of these grades satisfactorily. Difficulties were at times encountered, however, primarily in grammar and arithmetic, and an assistant remedial teacher functioned mainly to give this junior high-school aid. (5) No remedial aid was available for the senior high-school student because here his educational program was carefully adjusted in relation to his interests and his abilities.

From the records of these 14 years of remedial teaching, 33 boys fulfilled the conditions of this follow-up study. They were originally referred through weakness in reading. They had graduated from high school or had reached senior high school where remedial educational aid was not given. A complete record of remedial aid in subjects other than reading was available. Of this group, two had reached the limit of their educational achievement in the tenth grade and were placed in unskilled occupations. Twenty-five of the group had completed high school. The remaining six are now in high school. It is possible then to determine for this group the cause of the original reading difficulty, the time necessary to remedy this defect, and their subsequent educational progress.

Reading aid began for these 33 boys from the low first through the low sixth grades, as seen in Table I. The policy of Homewood Terrace to emphasize preventive in preference to remedial educational aid is reflected here. However, children were received in the orphanage to twelve years of age and some of these children proved to be non-readers.

TABLE I

GRADES AT WHICH REMEDIAL READING LESSONS BEGAN

Grade	No. of Boys
L 1	3
H 1	2
L 2	10
H 2	6
L 3	4
H 3	3
L 4	0
H 4	1
L 5	1
H 5	2
L 6	1
	33

TABLE II

AGE AT WHICH REMEDIAL READING LESSONS BEGAN

Age	No. of Boys
6	6
7	9
8	6
9	5
10	2
11	3
12	2
	33

The high second grade is the median grade at which lessons for reading weaknesses were begun. This was when the boys were, on the average, between 8 and 9 years of age, as indicated in Table II.

The Stanford–Binet Measurement of Intelligence (1916) was given to these boys on, or prior to, admission to Homewood Terrace, as a portion of the diagnostic measurements which preceded assignment for special teaching aid. This Binet measurement was repeated, on the average, once in two years thereafter. In one case there was a marked fluctuation of Binet I.Q. from 85 at age 7 (1916 revision) to 125 at age 17 (Revised, Form L). Since six of the ten Binet measurements given this boy clustered around 95, with range from 92–99, and his school progress was average, he is included in Table III as of average intelligence, I.Q. 95.

TABLE III

DISTRIBUTION OF STANFORD-BINET I.Q.'S OF NON-READERS

I. Q.	No. of Boys
70– 79	1
80– 89	5
90– 99	11
100–109	9
110–119	4
120–129	3
	33

The average I.Q. of this group (100.3) varies little from the average I.Q. of under-care children during these years. This ranged from 100.1 to 103.7, influenced by slight I.Q. variation and population change.

Summary: This group of 33 boys, educated in public schools, grew up in an orphanage with their educational progress closely checked, and with special educational aid given when necessary. They were an average group in mental ability, and began having remedial reading aid when an average of 8 years and 7 months in age. Sixty-four percent of the boys were given remedial lessons before they were 9 years of age or had reached the third grade in school.

REMEDIAL READING LESSONS

Referral Sources: Of the 33 boys in this follow-up study, 12 or 36 per cent were referred by their public school teachers. Six of these boys (Ave. I.Q. 105) were promoted on trial with recommendation for summer aid in reading. Six (Ave. I.Q. 89) were of dull ability. Special aid was suggested by the teacher to help these six maintain their grade placement.

The remaining 21 boys were placed on the special teaching schedule by the psychologist. Of these, 11 (Ave. I.Q. 102) whose placement educationally was below their level of ability, were found to be non-readers. Five boys (Ave. I.Q. 100), correctly placed in school, were non-readers. Five (Ave. I.Q. 95) were assigned special lessons because, combined with reading difficulties, there were emotional instabilities which presaged future difficulties in educational adjustment. Two of these five stammered when placed in Homewood at approximately six years of age; two had short periods of psychological deafness when 8 and 9 years of age; one was a left-handed

mirror writer whose problems of physical coordination and educational adjustment have been unique throughout his school progress.

Obstacles to learning to read: The remedial teacher received the psychologist's report of the child's abilities, the measured reading difficulties, home and school adjustment patterns, and emotional make-up. Through a personal visit with the child's public school teacher, she checked his school adjustments as seen by the teacher. Her first few interviews with the child consisted mainly of adroitly concealed tests which, presented as games with due rewards, served to interest the child as well as to reveal to the remedial teacher the sources of the difficulties which were preventing adequate reading progress.

These difficulties, defined as obstacles to reading progress, were found to be covered by the following classifications, and were present to varying extents in the individual children.

1. Lack of auditory discrimination.
   a. Ability to tell which of two or three words start with the same sound.
   b. Ability to recognize similar endings and to tell the end sound from the beginning one.
   c. Ability to recognize words that rhyme, and words that have a similar sound, whether they rhyme or not.
2. Lack of visual discrimination.
   a. Ability to match identical letters and words.
3. Failure to connect the visual symbol with its respective sound. (Both printed and written symbol).
4. Reversal tendency.
   a. Tendency to see letters and words reversed, transposed, or inverted.
5. Lack of attention.
   a. Short attention span: Attention flits quickly; unable to concentrate on simple objective as long as the average child of his age and ability.
   b. Lack of motivation: Uninterested in learning to read or in learning anything; bored by the whole educational situation.

6. Lack of self-reliance.
   a. Fear of failure: A marked inability to attack reading because of repeated failure experience. Involves detecting the simplest known fundamentals and building thereon through gradually increasing difficulties, accompanied always with the experience of success.
   b. Mental laziness: Intellectual inertia; dislike for the stimuli of school and retreat therefrom. Largely found in the daydreamer.
   c. Immaturity: Dull mental ability in a grade placement above ability to accomplish. In these cases, accompanied by infantile mannerisms.

Table IV indicates the number of children having one, two, or more obstacles to overcome in learning to read.

TABLE IV

NUMBER OF OBSTACLES TO BE OVERCOME IN LEARNING TO READ

Number of Obstacles	No. of Boys	%
1	7	21.2
2	12	36.4
3	10	30.3
4	3	9.1
5	1	3.0
	33	99.9

An average of 2.3 (roughly 2) obstacles were preventing the individual child from learning to read. The distribution of these obstacles in terms of definition follows in Table V. Although the number of boys possessing these various obstacles is small and the indicated trends therefore not significant, it is of interest to note the average I.Q.'s of the boys in relation to the obstacles confronted, as well as the grade ranges in which these boys were placed at the time the obstacles were discovered and lessons begun.

Thus 67 per cent of the 33 boys had difficulty in connecting the visual symbol with its respective sound; 70 per cent indicated attention difficulties either through short attention span or lack of motivation; 54 per cent lacked self-reliance, reflecting this lack through (a) fear of failure with its accompanying inability to place themselves in a position for failure, (b) through inertia and lack of interest which was probably retreat from earlier failure situations, and (c) through failure encountered in attempting work beyond their mental maturity.

TABLE V

NUMBER OF BOYS POSSESSING EACH OBSTACLE, THEIR AVERAGE I.Q., AND RANGE OF GRADE PLACEMENT

Obstacle	No.	Average I. Q.	Grade Range
1. Lack of auditory discrimination	5	100. 8	1–5
2. Lack of visual discrimination	5	106. 7	1–6
3. Failure to connect visual symbol and sound	22	96. 1	1–6
4. Reversal tendency	5	91. 2	1–5
5. Lack of attention			
a. Short attention span	17	99. 1	1–5
b. Lack of motivation	6	104. 0	2–3
6. Lack of self-reliance			
a. Fear of failure	9	99. 4	1–6
b. Mental laziness	7	102. 7	1–5
c. Mental immaturity	2	88. 0	2
	78		

Other studies (8, 10) have shown that making reversals is a characteristic stage in the process of learning to read and forming the habit of left to right attack. The children in this group showing marked reversal tendencies, with need for remedial aid, happen to possess a lower average I.Q. than do the boys with other types of obstacles, with the single exception of the mentally immature.

Number of lessons needed to correct non-reading: Remedial lessons began when a difficulty was detected by the school teacher or the institution psychologist. The intensity of the lessons was determined by the remedial teacher as a result of her analysis of the problems of the individual. Her schedule was then adapted to include the boy in half-hour lessons daily, three days a week, or two days a week according to her judgment of need. The lessons continued until, in the collaborative opinion of the remedial teacher and the public school teacher, satisfactory reading ability had been achieved. This reading aid ranged from 44 half-hour periods of instruction to 1371 half-hour periods. If given daily lessons for a semester, approximately 90 half-hours would have been received by the child. The above range then indicates that given brief assistance, the reading difficulty was overcome, yet in the extreme case (1371 half-hours) continual reading supervision was needed not only through the six elementary grades by occasionally

TABLE VI

NUMBER OF HALF-HOUR LESSONS NEEDED TO REMEDY NON-READING

No. of Half-hours	No. of Boys
0– 99	5
100– 199	8
200– 299	8
300– 399	5
400– 499	3
500– 599	2
1000–1099	1
1300–1399	1
	33

intensified during the summer months. This is the one boy indicated in Table IV as having five obstacles to overcome in learning to read—a psychopathic child who has been given educational aid throughout his entire elementary years.

The number of half-hour lessons needed to correct weakness in reading is indicated in Table VI.

On the average, 316.2 half-hours of remedial lessons were needed to correct the reading difficulties encountered by these boys. Roughly, this is the equivalent of three semesters of daily individual reading aid. Because of the flexibility of lesson intensity, these were given in a range of from one semester to continuous supervision throughout the elementary school career. If needed, the lessons were expanded to one-hour of daily assistance during the summer vacation. These are counted in the above tabulation as two half-hour periods.

Interrelationships: There remains to be discovered whether there is any relation between the age or grade at which remedial lessons began, the number of obstacles present, the type of obstacles to be overcome, and the number of lessons required to produce reading adequacy. Table VII indicates these interrelationships.

The correlation between age and I.Q. indicates a trend toward higher I.Q.'s among the children who were older when remedial reading lessons were needed. There is, as expected, a positive relation between age and grade placement. This is lowered by the fact that six of the boys were below grade in relation to their chronological age; nine below grade in relation to their mental age.

TABLE VII

CORRELATIONS BETWEEN INDICATED FACTORS

	Age		I. Q.		Grade		No. of Lessons		No. of Obstacles	
	r	PE	r	PE	r	PE	r	PE	r	PE
Age										
I. Q.	.34	.10								
Grade	.77	.05	.02	.12						
No. Lessons	.07	.12	.04	.12	.02	.12				
No. Obstacles	.24	.11	.04	.12	.32	.11	.08	.12		
Type of Obstacles	.14	.11	.07	.12	.11	.12	.09	.12	.01	.12

The number of lessons which were needed to correct the non-reading defect were not related to the age or grade which these lessons began or the I.Q. of the boy. While the correlation between the grade at which lessons began and the number of obstacles to be overcome in learning to read is reliable, it is nevertheless low. There is, then, a tendency toward fewer obstacles if the lessons are begun in the lower grades, yet the indication that early reading difficulties may be due to few or many factors. There is no relation between the number of obstacles to learning to read and the age or I.Q. of the child, nor is the number of obstacles to be overcome any criterion of the number of lessons which will be needed to overcome these obstacles.

Zero order correlations indicate a complete lack of relationship between the type of obstacles found and the age, I.Q. or grade placement of the child when the lessons began. Nor is there a relation between the number of lessons needed and the type of early obstacles to be overcome; the number of obstacles and the type of obstacles found.

One may conclude that the non-reader of this study is an individualist with problems and needs which must be tempered to his pattern, with little possibility of accurately predicting the type or extent of his need for remedial reading lessons, no matter what his age, grade, or mental ability.

ADDITIONAL EDUCATIONAL AID RECEIVED

As has been indicated, the educational progress of these under-care children was checked annually (beyond the acceptance of report cards as indicators) through standardized educational measurements, and supplementary tests when doubts existed. If, as the child progressed through the elementary grades, below ability accomplishment was discovered, or specific

educational difficulties encountered, the child and his problem were again referred to the remedial teacher.

The decision to give this additional aid was made with the same care used in forming the original decision for non-reading assistance. The remedial teachers were personally popular and lessons were considered coveted privileges. For the children from grades one through six, they meant fifty minutes of release from the classroom situation—ten minutes each for the journey from school and to the remedial classroom, and return to school, plus the half-hour of individual attention. It was, therefore, entirely to be expected that children would seek lessons when encountering minor difficulties which they hoped the special teachers would help them overcome. Here educational measurements and a check with the classroom teacher, particularly on factors involving attention, were essential.

It may be assumed that additional educational aid was given to the boy only in case of (1) demonstrated weakness in the individual subject in which aid was given, or (2) constitutional inferiority of a type which required continuous supervision and assistance. Two of the 33 cases are those in which psychopathic personalities created, in addition to certain educational weaknesses, definite attention and behavior problems in the classroom. These cases were guided by classroom-remedial teacher cooperation which emphasized rewards for effort and accomplishment. The amount of attention given these two children varied from semester to semester, depending on need, but some supervision was continuously given them throughout the eight elementary grades.

Additional educational aid at time of non-reading lessons: When it was discovered that a boy who had originally been referred as a non-reader was having difficulty in other subjects, remedial aid was given coexistent with, but supplementary to, the remedial reading aid. Here we find that fifteen or 45 per cent of the group were helped in "numbers" while receiving remedial reading attention. Or, 85 per cent of the boys who received aid while in grades one through three were having difficulty in making educational adjustments in *both* reading and arithmetic.

This is the first verification of the expressed hypothesis that non-reading, in the majority of cases, may be merely the original expression of the child's inability to respond adequately to the average classroom instruction. It suggests also that the conclusions of Gray and Leary (2) which they have related

specifically to the junior high school level and beyond, may also be pertinent for elementary arithmetic from its very beginnings. They state that difficulty in mathematics is not essentially a reading difficulty, but is due primarily to lack of knowledge of mathematical language. We would modify this to: difficulty in acquiring the habits of arithmetical thinking, which include habits of close observation, attention, and patient and persistent application.

Extent of additional educational aid: Of the 33 boys in this follow-up group, nine or 27 per cent needed no educational aid beyond the original lessons given. Of these nine, three were given lessons in reading only. At the time of these lessons they were in the high second, low third, and high third grades. The remaining six had been helped in "numbers" while receiving non-reading aid and were distributed from the high first through the low third grades. Thus, the 27 per cent who were able to achieve satisfactory educational adjustment, after specific assistance, were boys whose weaknesses were detected and remedied early in their educational career.

There were 24, or 73 per cent of the boys, however, who needed educational aid at some time after the non-reading lessons had discontinued, and before they had completed the eighth grade. The extent of these half-hour corrective periods is indicated in Table VIII.

It is significant that while an average of 316.2 lessons were needed to correct the original non-reading, an average of 314.1 additional half-hours of remedial educational aid was needed by 24 of these boys before they satis-

TABLE VIII

NUMBER OF HALF-HOUR LESSONS GIVEN IN ADDITION TO ORIGINAL NON-READING LESSONS

No. of Half-hours	Additional Lessons No. of Boys	Non-reading lessons No. of Boys
0– 99	6	5
100– 199	6	8
200– 299	4	8
300– 399	1	5
400– 499	3	3
500– 599	1	2
600– 699	1	0
900– 999	1	0
1000–1099	0	1
1300–1399	1	1
	24	33

factorily completed the eighth grade. The correlation between the number of original lessons and subsequent educational aid is .08 ± .12, indicating that the amount of aid needed to correct non-reading is not related to, or predictive of, the amount of additional educational aid which will be needed before the child has completed the eighth grade.

For this group, delayed detection and remedying of non-reading has been accompanied by educational difficulties in other subjects. This is attested by the correlation of .15 ± .12 between grade placement at the time of the original non-reading lessons and the number of remedial lessons needed in other subjects before completing the eighth grade. Thus, for 24 of the 33 boys, non-reading was a more deeply rooted problem than merely that of correcting a specific subject matter defect. This leads to the assumption that non-reading implies that certain maladjustive habits toward classroom instruction have been formed, and that these patterns reflect in methods of other subject matter attack.

An experiment is now being undertaken in which the preventive emphasis is placed on first and low second grade reading efficiency. This reading training is being closely related to the acquisition of correct habit patterns—the development of habits of attention and self-reliance.

The importance of behavioral and emotional adjustments within the educational situation is again emphasized by the lack of relation ($r = .05 \pm .12$) between intelligence, as measured by the Stanford–Binet, and the number of additional lessons needed.

Table IX details the number of boys who received aid in relation to the subjects in which aid was given, and the age of the boy at the time of beginning non-reading lessons. The table should be read: two boys who secured remedial reading aid at age 6 needed help in arithmetic and spelling some time before completing the eighth grade; two needed help in arithmetic, spelling, grammar, and history; one needed help in arithmetic, spelling, grammar, history and writing.

Of particular interest in the above tabulation is the fact that 28 of the 30 boys who needed educational assistance in subjects other than reading, needed some assistance in arithmetic before completing the eighth grade.

Thus it is found that: (1) of the 33 non-readers, 30 were in need of educational assistance in subjects other than reading. (2) Six were given help in "numbers" coexistent with their non-reading aid. They then needed no

TABLE IX

SUBJECTS IN WHICH ADDITIONAL EDUCATIONAL AID WAS GIVEN, ITEMIZED IN RELATION TO AGE AT WHICH NON-READING LESSONS BEGAN

Age began non-reading lessons	Arithmetic	Spelling	Arith & Spell.	Arith & Gram.	Gram. & Spell.	Ar, Sp, Gr, Hist.	Ar, Sp, Gr, Hist, Writ.	Total
6			2			2	1	5
7	4		4			1		9
8	2		1	1			2	6
9	1		2					3
10						2		2
11		1				2		3
12			1		1			2
	7	1	10	1	1	7	3	30

further educational assistance. These six were in Grades 1–3. (3) Twenty-four (73%) received help in subjects other than reading while they were in Grades 4–6. (4) Nine of these 24 still needed educational aid when they were in Grades 7–8.

For this group of boys who attended public schools and lived in a modern cottage plan orphanage (where close supervision was given to assure educational progress commensurate with the ability of the child) difficulty in learning to read was merely one expression of difficulty in educational adjustments. Only three, or 9 per cent of the group were able to adjust satisfactorily after non-reading had been corrected. Thirty, or 91 per cent of the group needed aid in other subjects enroute through the eight elementary grades.

EMOTIONAL PROBLEMS PRESENT WHEN NON-READING LESSONS BEGAN

The 33 boys of this group were selected because they were first referred to the remedial teacher as non-readers and because, since their original lessons, they have all completed at least the junior high school level. Their problems were investigated by the intensive method of case-study approach detailed by Blanchard (1) with, as one result, the highlighting of personality characteristics, emotional, and behavioral adjustments.

Definition of the outstanding emotional characteristics: Through these case histories, standardized measurements, and close personal knowledge of the individual children, it was found that typical personality characteristics, emotional and behavior reactions could be roughly defined in five categories:

the aggressive boy, the daydreamer, the nervously hyperactive, the stammerer, and a "miscellaneous" group in which the problems of non-reading were not markedly emotionally toned.

There is present within each category a continuum of behavior intensity. The *aggressive* group includes the boy who reacts to reading failure through mildly overt antisocial conduct, as well as the boy whose antisocial reactions became so marked as to require placement in a penal institution. The *daydreamers* range from mild daydreaming as a failure retreat, to the serious use of this retreat throughout the educational career with its attendant danger of possible future schizophrenia. Two of the daydreamers had retreated into psychological deafness, which disappeared with more adequate reading and emotional adjustment. The *nervously hyperactive* group includes the conscientious fussbudget as well as the more disturbing, wiggly, nervously quick youngster possessed of nervous tics and mannerisms of some prominence. The two who *stammered* presented extremes of a continuum; one responding readily to non-reading and speech instruction and needing no further assistance; one whose stammering proved to be merely one manifestation of serious emotional maladjustment which required continual supervision throughout the elementary grades.

The five of the *miscellaneous* group included three amiable, dull boys, earnest, emotionally stable; one bright boy, stable, and quickly able to overcome the non-reading difficulty; one mirror writer whose problems were those of physical coordination and habit training, whose earnestness and tenacity have been accompanied by emotional soundness.

Distribution of characteristic emotional patterns: The population frequencies of these characteristic continuums, together with the average I.Q.'s of the boys within each group, are given in table X.

Thus twenty-eight, or 85 per cent of the non-readers were found to present emotional problems of varying intensities and types. Further verification of emotional maladjustments is found in the report of the remedial teacher (p. 610) that for 23 or 70 per cent of the boys, learning the mechanics of reading was complicated by factors of attention. Eighteen, or 54 per cent showed lack of self-reliance that inhibited adequate reading attack.

It is of interest that all of the boys placed in the "aggressive" classification were referred by the public school teacher for reading aid. Only one daydreamer of the nine in the group was referred by the public school, and he

TABLE X

FREQUENCY, AND AVERAGE I.Q. OF BOYS POSSESSING THE DEFINED EMOTIONAL CHARACTERISTICS

Classification	No. Boys	Ave. I. Q.
Aggressive	11	95. 4
Daydreamer	9	103. 1
Hyperactive	6	98.
Stammerer	2	108.
"Miscellaneous"		
Dull	3	83
Bright	1	120
Mirror writer	1	89
	33	

because of a daydreaming retreat so serious as to cause the comment: "He's completely unconscious." This reflects Wickman's findings (9) that problem conduct recognized by the public school teacher is prone to be that conduct which interferes with the smooth running of the classroom.

Non-reading for the group under study is then not merely non-reading, but is in the majority of cases, just one expression of difficulties of educational and emotional adjustment.

Possible influence of institutional residence on non-reading: The question arises whether this is a typical group to be found in the average school population, or whether these problems of emotional and educational adjustment are related to maladjustments which have resulted in orphanage residence, or are enhanced by orphanage residence.

While only 3 or 9 per cent of the total group of boys were full orphans, it is true that the remaining 30 were also victims of a broken home situation. This includes the loss of one parent, parental divorce and marriage to others, causing a superfluity of parents, or placement due to inadequate supervision in the home.

Twenty, or 61 per cent of the boys placed for remedial reading were detected as non-readers during their first school semester after placement in Homewood Terrace. In two additional cases the boys had progressed normally educationally while in the orphanage, had returned to their homes for a period of two and three years, then again were placed in the orphanage where remedial reading lessons were now found necessary.

Thus, for roughly two-thirds of the boys in this group, non-reading was the seeming accompaniment of environmental situations which existed prior to their placement in a group situation. The difficulty was not related to the problems which might arise as a result of group living.

Among the remaining 11 of the group are the three dull and one bright boys of Table X, indicated as possessing no specific emotional difficulties; six average boys whose reading problems were slowly cumulative to final need for aid in the 4th and 5th grades; one bright boy of the stammerer group whose speech defect disappeared with remedial reading, and whose subsequent educational and emotional adjustment were excellent.

It is possible, then, to state that for 27 or 82 per cent of this group the fact of non-reading (1) was apparent as soon after placement in the institution as the boy's educational and emotional adjustments could be adequately judged, i.e. within his first school semester after this placement, and (2) in the remaining cases was not accompanied by emotional difficulties.

Possible influence of institutional residence on additional educational needs: For this group additional educational aid is the result of (1) careful guidance to insure maximum use of the child's ability, (2) a preventive emphasis which assured that uncorrected difficulties with fundamentals in any subject had the potentialities for becoming cumulatively serious.

It can be stated that roughly 68 per cent of the group whose residence in Homewood Terrace paralleled that of the boys in this follow-up study (i.e. permanent residence through their school careers) needed no remedial educational aid. This non-reading group, then, began institutional life with educational and emotional handicaps beyond their ability to correct without assistance. The large need for remedial aid beyond non-reading may reflect this fundamental maladjustment. That institutional life, per se, cannot be considered entirely causal is reflected also by the decreasing need for assistance in grades seven and eight.

The writers know of no study wherein comparable data is available concerning non-readers living in their own homes. The assumption has been that non-reading remedied, the child has progressed normally in his subsequent school adjustments. Special attention and educational follow-up seem to have accrued largely in the case of the exceptional child whose educational or emotional maladjustments have presented administrative problems.

Subsequent emotional adjustment: Checking the developmental histories of these boys in the comprehensive reports on file, it was found that of the 11 boys whose conduct was reported as aggressive above the average, 10 showed marked behavior and emotional improvement. The one remaining boy of this group was placed in a penal institution as a psychopathic delinquent. Eight of the daydreamers became markedly more socially and emotionally adjusted. One required longer intellectual and emotional supervision, finally making a near-normal adjustment. The nervous hyperactivity of four of the six boys was tempered to the average. Two, although showing behavioral improvement, continued nervously active beyond the average. One stammerer improved quickly and needed no further special guidance, while, for the second, continual aid and supervision were needed.

Summary: There were 28 boys whose non-reading was accompanied by emotional maladjustments. Twenty-three or 85 per cent of these indicated regression from the extremes toward the normal in emotional and behavioral patterns. The remaining five were referred for non-reading within the first semester of their institution residence. For them, the defect was specific, carrying with it no undue emotional involvement.

Non-reading, and characteristic emotional and behavioral patterns were present among 22, or 67 per cent of the group at the time of placement in Homewood Terrace. For five boys, non-reading was a specific difficulty unaccompanied by emotional involvement. Thus, for 27, or 82 per cent of this group, the fact of non-reading was not related to the emotional stresses which, theoretically, might be present while living in a group situation.

The original difficulties of educational and emotional adjustment shown by the boys of this group are more closely related to the vagaries of preplacement environment than to the influences that residence in a group situation might exert.

Sixty-eight per cent of the total group living at Homewood Terrace, having similar educational experiences and home environment, did not need special educational assistance.

RELATION BETWEEN EMOTIONAL MALADJUSTMENTS AND NEED FOR ADDITIONAL EDUCATIONAL AID

Because of the limited number of boys within each of the above defined emotional classifications, the findings here are suggestive only. The question of whether more educational difficulty is encountered enroute through the

TABLE XI

AVERAGE NUMBER OF NON-READING AND ADDITIONAL LESSONS GIVEN TO THE BOYS

Classification	No. Boys	Ave. No. Non-Reading Lessons	Ave. No. Additional Lessons
Aggressive	11	366. 7	388. 7
Daydreamer	9	331. 5	223. 1
Hyperactive	6	233	87
Stammerer	2	336	236
"Miscellaneous"			
Dull	3	219. 7	355
Bright	1	44	0
Mirror writer	1	189	562
	33		

schools by the aggressive boy, the daydreamer, or the hyperactive boy is, however, of interest. Table XI details the average number of lessons needed by the boys in each classification before the original non-reading difficulty was considered overcome, and the average number of lessons given in other subjects before the boy had completed the eighth grade.

Few lessons were necessary to correct the reading difficulty of the bright child and place him in a position to continue adequately through the elementary grades. The boys considered to be hyperactive needed fewer reading lessons and had comparatively little difficulty in further educational adjustments. The aggressive boy had the greatest difficulty in acquiring correct reading habits and continued to have the largest difficulties in future educational adjustments.

The opportunity, given through special lessons, to feel successful and show off, and the feeling of friendly personal interest in his progress seem to be more satisfying to the daydreamer and the hyperactive boy than to the aggressive boy.

Nine of the 33 boys needed no lessons beyond those of the original remedial instruction. Of these nine, three could be considered as aggressive, two as daydreamers, one as hyperactive, one a stammerer, and one the bright boy listed in the above tabulation.

PRESENT STATUS OF THE GROUP

What of the future? What has happened to these boys who needed aid in their educational progress? Table XII details the present status of these

TABLE XII

PRESENT STATUS OF THE 33 BOYS IN RELATION TO THEIR EARLY EMOTIONAL CLASSIFICATION

Classification	Agg.	Daydr.	Hyper.	Stam.	Dull	Bright	Mirror W.	Total
Working	4	6	5	1	3			19
In Jr. College	1	3	1					5
In college				1		1		2
In high school	5						1	6
In prison	1							1
	11	9	6	2	3	1	1	33

boys in relation to their emotional classification when beginning non-reading lessons.

Nineteen of the 33 boys are working. Of these, 17 completed high school, two dropped out of school at the tenth grade after reaching the limits of their abilities. Seven are in college or junior college, six are now in high school, and the one boy early (age 9) indicated as lacking in inhibitions and possibly psychopathic is in a penal institution as a psychopathic delinquent.

Personal acquaintance with these boys and their developmental history emphasizes a personality consistency and behavior congruence which would, today, place them in the "typological" classifications in which they were placed when first having lessons for reading difficulties. The predominantly aggressive boy has become, as a young man, a person whose life reactions tend rather to aggressive attack than to daydreaming. The daydreamer lacks aggression and still daydreams with, however, the tendencies modified to the work-a-day world. The hyperactive boys, though modifying their extreme behavior patterns, still tend to act first and think afterwards. The two stammerers present divergent adaptive patterns; one responding quickly and permanently, the second seemingly possessed of a fundamental emotional instability which results in the reappearance of stammering during periods of severe emotional stress.

SUMMARY AND CONCLUSIONS

Thirty-three boys living in a cottage plan orphanage have been given remedial reading instruction, and such additional educational aid as was needed as they progressed through the eight elementary grades. Through a follow-up study of their progress and needs, the following facts appear:

1. The average I.Q. of the group was 100.3. Sixty-four per cent were given remedial reading lessons before they were 9 years of age or had completed the third grade in school.

2. The need for remedial reading was detected for one-third of the group by the public school teacher. The remaining two-thirds were discovered through standardized measurements used by the institution psychologist.

3. Failure to connect visual symbol and sound, lack of attention, and lack of self-reliance were the most prevalent obstacles to learning to read.

4. The following interrelationships were found:

(a) Zero order correlations suggest that age and grade when non-reading is detected are not related to the number of lessons which have been needed to overcome the difficulties.

(b) Intelligence (I.Q.) is not related to, or predictive of, the number of lessons which have been needed to overcome the reading defect.

(c) There is a tendency for the children in the higher grades to have more obstacles to overcome in learning to read than do those in the lower grades. This correlation, however, is too low to indicate more than a reliable trend.

(d) There is no relation between the number of obstacles to be overcome in learning to read and intelligence, or number of lessons needed to overcome these obstacles.

(e) There is no relation between the type of obstacles developed in learning to read and intelligence, age, or grade when the lessons were begun.

5. That difficulty in learning to read was just one expression of the boy's difficulty in educational adjustment is indicated by the following findings:

(a) Only 3 or 9 per cent of the total group given lessons in remedial reading were then able to progress normally through the elementary grades without further educational assistance.

(b) 15 or 45 per cent of the group were helped in "numbers" (Gds. 1–3) while receiving remedial reading aid.

(c) 9 or 27 per cent needed no further lessons beyond the initial remedial period. For six of these boys, however, "numbers" instruction was necessary in addition to remedial reading.

(d) Thus, 30 or 91 per cent of the non-readers needed and received educational aid in subjects other than reading.

(e) After the non-reading lessons had discontinued, but some time before the completing of the eighth grade, 24 or 75 per cent of the group received educational assistance in subjects other than reading.

(f) All of the 24 received educational assistance before completing the sixth grade. Nine of these still needed assistance when in the 7th and 8th grades.

(g) Arithmetic, spelling, grammar, history, and writing were the subjects in which additional educational aid was given.

6. The following relationships were found between the original non-reading lessons and additional educational aid:

(a) Zero order correlation indicates that, for this group, the number of lessons needed to remedy reading difficulties was not related to, or predictive of, the number of lessons which were needed to remedy future educational problems.

(b) The nine boys who progressed normally after the remedying of their non-reading problems were all given this assistance before completing the third grade. For the remaining 24 of the group, however, there is no relation between grade placement at the time of the original non-reading lessons and the number of additional remedial lessons needed in other subjects. This suggests that maladjustive educational habits may be crystallized during the first and second grades, and that remedial and preventive emphasis should be placed here.

(c) That factors other than intelligence are involved, is indicated by the zero order correlation between I.Q. and the number of additional remedial lessons needed by the boy.

7. Defined emotional maladjustments accompanied non-reading in 28 or 85 per cent of the cases. These included problems of aggression, day-dreaming, nervous hyperactivity, and stammering.

8. For 22 or 67 per cent of the group, these emotional maladjustments and non-reading were present at the time of placement in the orphanage.

9. Sixty-eight per cent of the children who grew up in the orphanage during the period of this study did not require special educational assistance.

10. It was, on the average, more difficult for the aggressive boy to overcome his non-reading, than for the daydreamer or the nervously hyperactive boy. The aggressive boy needed, on the average, more additional educational aid than did the boys in the other classifications.

11. Personality characteristics of these boys, when grown, reflect an underlying behavioral and emotional consistency. The aggressive boy, the daydreamer, and the nervously hyperactive remain true to their earlier classification with, however, behavior patterns tempered to more adequate social adaptation.

These data support the hypothesis of this study—that, in the majority of cases, non-reading may be merely the original expression of the child's inability to respond adequately to average classroom instruction.

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EDITORIALS

USES OF FISHERIAN STATISTICS

THERE appeared in the March issue *of the Journal of Educational Research* a paper by Peter's on misuses of the R. A. Fisher tecsniques. From the illustrations given by Peters, there would seem to be no need for the development of other techniques, if they serve the same purposes as the old. Much credit is rightfully given to "Student". "Student's" contribution to the theory of errors was that by finding the exact sampling distribution of the best estimate of the variance of the population, allowance could be made for its sampling errors; thereby making possible a test of significance which was exact and rigorous. Another definite contribution by "Student" was the removal of the restriction that the sample must be "sufficiently large." Since "Student's" time much of the advance in modern statistical science has been due to the development of exact tests of significance. Previous to the introduction of exact tests of significance, when a number of mean values were obtained with a view to testing their significance, it was common to calculate independently a standard error for each mean and thus obtain a standard error for each possible comparison to be made. The change which made possible exact tests of significance was that of pooling the sum of squares of deviations and using the pooled estimate for all the tests of significance required.

There are three phases of the problem of testing whether two samples could have been selected at random from the same population.

1. To test the hypothesis, H_1, that the means of the populations are equal and that the standard deviations are equal against the set of all alternative hypotheses which specify only that the means are unequal or that the standard deviations are unequal, or both.

2. To test the hypothesis, H_2, that the means are equal while the alternatives specify nothing except that the means are unequal.

3. In connection with the populations it is assumed as given that the standard deviations have the same (though unknown) value, to test the

hypothesis, H_0, that the means are equal against the set of alternatives that the means are not equal.

If the means and sums of squares of the deviates for two random samples of sizes n_1 and n_2 are represented by x_1, x_2, Σx_1^2, and Σx_2^2 two criteria may be set up:

$$\text{Let } u = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \qquad (1)$$

$$\text{Let } v = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{\Sigma x_1^2}{n_1(n_1 - 1)} + \frac{\Sigma x_2^2}{n_2(n_2 - 1)}}} \qquad (2)$$

Obviously, the two criteria are identical if $n_1 = n_2$.

R. A. Fisher (1925) was the first to prove that whenever the two normal populations are identical u (as in (1)) calculated from the two samples follows exactly the t– distribution of "Student." R. Sato (1937) obtained results to indicate that, if the hypothesis to be tested is H_0 the t-test is uniformly the most powerful of all the unbiased exact tests. Further consideration of the uses of (1) and (2) cannot be given here, but the point to be made is that the classical formula proposed by Peters may or may not be the appropriate one to use. Of course, when the means of more than two groups are under analysis, the analysis of variance provides the appropriate test. The only alternative is to use the laborious and inexact method to obtain a different standard error for each possible comparison to be made.

In cases where the two samples are equal in number, and in which each individual of one sample corresponds in some way to a particular individual of the second sample, we may test the significance of the difference of the means by the method as originally set forth by "Student," or by the use of the formula for the standard error of the differences between the means of matched groups. In the application of the latter, it would be advantageous to calculate the standard error of the difference between means by working with the original scores, thus:

$$\sigma_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\Sigma(X_1 - \bar{X}_1)^2 + \Sigma(X_2 - \bar{X}_2)^2 - 2\Sigma(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{N(N - 1)}}$$

Fisher recommends that the test of significance between the means of random samples be also applied. This would be equivalent to omitting the third term in the enumerator in the formula above. If either shows a significant deviation, it is evidence which cannot be ignored. The results of applying both tests to the same data supply a direct statistical measure of the system of controls which has been used.

It is not possible to point out here the numerous uses to which modern statistical science can be put in the fields of education and psychology. If the modern principle that the question of the experimental procedure and that of statistical analysis are but two aspects of the same problem were more generally used in educational research, it is likely that statistical analysis would not be restricted to a *post-mortem* analysis of data, as is now most often the case. Furthermore, those research workers who have not become the victims of the doctrinaire theory that experiments must be designed to apply the so-called law of the single variable have found the application of some of the new types of experimental design fruitful.

Following is a list of some of the major contributions of Fisher to statistical science and experimental design. It may also be recalled that Fisher was born in 1890.

1. Found the exact solution of the distribution of the coefficient of correlation (1915). The earliest example of the modern type of distribution was that of chi-square by Karl Pearson in 1900. "Student" gave the distribution of the sample variance and of his famous t– statistic. The problem of finding such distributions is one of great mathematical difficulty and very little progress was made until Fisher began working on the problem. Fisher gave a rigorous proof of "Student's" results for the t– statistic in 1923, and soon extended the solution to a variety of problems beyond that for which "Student's distribution was originally prepared. In the solution of the problem of the distribution of the coefficient of correlation, Fisher introduced for the first time the brilliant technique of representing a sample of size n by a point in space of n– dimension. This concept is fundamental in modern statistical theory.

2. Solved the problem of the exact distribution of the intra-class correlation; introducted the z– transformation for both inter- and intra-class correlation (1921).

3. Published (1922) his classical memoir on "Mathematical Foundations of Theoretical Statistics," which designed the framework for modern statistical theory.

4. Published (1923) his first paper on field trials, which revolutionized the technique of agricultural trials and altered the subsequent course of agricultural experiments throughout the world. The z– test of significance and the analysis of variance were developed at about the same time.

5. *Statistical Methods for Research Workers* was first published in 1925 and has now run to eight editions. This book has very likely done more than any other source to make research workers in all fields familiar with the practical applications of modern statistical methods and especially to inculcate a statistical attitude among young scientists. The *Design of Experiments* was published in 1935; a second edition in 1937; a third in 1942. This has given us the logical foundation of scientific inference and the principles developed are finding increasing application in industry, biology, medicine, public health, psychology, and all scientific fields. It is truly the *novum organum renovatum.*

6. Contributions to the Theory of Estimation and Statistical Inference: Method of maximum likelihood; Criteria of optimum estimates, consistency, efficiency, sufficiency; Concept of quantity of information; freeing the theory of estimation from large sample assumptions; Concept of ancillary statistics; idea of fiducial probability leading to the method of interval estimation.

7. The introduction of the discriminant function (1936), its distribution and application. The exact distribution of the regression coefficient (1922), the partial correlation (1924), and the coefficient of multiple correlation (1928).

8. Contributions to genetics, especially the application of the method of maximum likelihood; and to the study of quantitative characters by providing a mathematical basis for genetical study.

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ANALYSIS OF VARIANCE IN PSYCHOLOGICAL RESEARCH

THERE are two misconceptions which one frequently encounters among psychologists not well acquainted with R. A. Fisher's methods. The first is that Fisher has somehow invented a new system of statistics; and the second is that analysis of variance is primarily, if not exclusively, concerned with the treatment of small samples. Neither of these notions is correct.

The originality and power of Fisher's methods lies in their emphasis upon experimental design or procedure, and not in their introduction of new statistical techniques*. Except for the consistent use of "degrees of freedom", analysis of variance involves few concepts and little mathematics not found in classical statistics. In fact, actual computations demand little more than simple arithmetic. Nor are small samples an essential feature of Fisher's work. Fisher's use of small groups grew out of the fact that he wrote for agriculturists and biologists who must perforce work with few observations. It can be shown that the sampling errors of the means of small samples do not follow the normal curve of error, but rather a distribution ("Student's distribution") in which the occurrence of large deviations is somewhat more probable than in the normal curve. The *t*–ratio, which is based upon Student's distribution, is essentially a critical ratio; when samples are less than 25 it is much more exact than is the familiar D/SD_D. For samples larger than 25, Student's distribution is practically equivalent to the normal probability distribution. Since psychologists usually work with more than 25 subjects (except in laboratory investigations) they will seldom need to employ the *t*–test instead of the better known *CR*; but they should certainly know about it.

When several independent groups are to be compared, the methods of analysis of variance into between and within groups offer many advantages over older procedures. One advantage is that a more accurate estimate of experimental error is obtained, since (on the null hypothesis) a single standard error is calculated from *all* of the groups combined, rather than many standard errors from separate groups. Another advantage is that an all-over test of significance (the *F*–ratio) may be computed. *F* tells us whether *any* of the differences among means is significant, and hence may tell us whether continuance of the experiment is advisable. When two or more groups are *not* independent, analysis of variance is somewhat more

* Garrett, H. E. and Zubin, J." The Analysis of Variance in Psychological Research", Psychol. Bull., 1943, 40, 233–267.

complex than when groups are independent. But the additional information obtained makes the method preferable to the traditional approach. For one thing, an estimate of experimental error freed of any systematic differences in the means can be made. Further, the significance of the variations *within* groups may be determined as well as the significance of differences *between* group means.

Perhaps it is in the "factorial designs" of Fisher that analysis of variance shows to greatest advantage over classical experimental procedures. Factorial or multiple-variate design enables the experimenter to measure the effects of several factors in turn upon the variable under investigation. Factorial design permits a broader basis for generalization than is possible in the single-variate experiment. In the latter the attempt is made—not always successfully—to control by matching or otherwise all of the important variables except the experimental factor under study. By contrast in factorial analysis as in partial correlation, the experimenter is able to segregate and evaluate separately each of several variables under "natural" conditions of variability. One disadvantage of multi-variate design should, however, be mentioned. This is that not so many values of a single variable can be studied as is possible when all but the variable concerned are experimentally controlled.

The matched-groups method in which a control and one or more experimental groups are equated for several factors has been widely used in psychology, and is often an adequate and desirable procedure. It should be remembered, however, that matching inevitably reduces variability and restricts the generalization which the experimenter is entitled to draw from his data. The greater the number of variables controlled by matching, the greater the restriction in the final conclusions. Covariance analysis will prove valuable in many psychological experiments in which the experimenter wishes to remove the influence of some initial condition upon final outcome.

In brief summary, Fisher's analysis of variance is useful to psychologists because (1) it often permits of a more efficient experimental arrangement; (2) it provides a better estimate of experimental error; (3) it allows evaluation of the specific contributions of several variables as well as the interactions of these variables; (4) it enables the experimenter to draw broader inferences from his results.

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April 9, 1943.

REVIEWS

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LOGAN WILSON, *The Academic Man:* A Study in the Sociology of a Profession. New York: Oxford University Press, 1942. Pp. viii + 248. $3.00.

The author of *The Academic Man* is a sociologist who has employed the special concepts and techniques of his field in an analysis of the university faculty. A series of chapters on the academic hierarchy of graduate student, apprentice or assistant, staff member, and administrator points out: that scholarships and fellowships, originally a mark of distinction, have also become a highly competitive scheme for filling the graduate school; that the Ph. D., instigated as a research degree, has become for most persons simply a license to teach in the college or university; and that administrators, in their zeal to promote productive work, may cause quality to deteriorate through overemphasis on quantity. Chapters on the academic status of the faculty indicate that personnel issues of faculty appraisal, professional organizations, and socio-economic environment as problems of social relations and human organization have received much less attention than administrative organization and physical facilities. Discussions of prestige, competition, and rewards deal with the institution itself, the teaching function, and productive activity.

Wilson admits that he probably has given more attention to the dissatisfactions than to the satisfactions of a university career. His well turned phrases more frequently produce a wince than a smile on the part of the staff member of a higher institution. W. W. Charters, at the time of his retirement from the staff at Ohio State University in June, 1942, said that Wilson's book might appropriately be called *The Pathology of the Academic Man.* On the other side of the ledger, Charters went on to recount his own satisfactions in a long university career: (1) the opportunity to pioneer in education (and there are still educational frontiers); (2) the challenge of working with bright young people; (3) happiness in one's family in a college community; and (4) enjoyment in organizing ideas, discussions, and programs of action.

It is emphasized that only through studies by staff members as participant observers can the social problems of the academic man be attacked directly and intelligently. The author draws freely on the related literature and statistical studies. The reader may be interested in somewhat similar analyses of the teacher below the college level by Beale, *Are American Teachers Free?* (Scribner's, 1936) and of the scholar by Znaniecki, *The Social Role of the Man of Knowledge* (Columbia University Press, 1940). Wilson's sociological analysis should be widely read by groups interested in

higher education—faculty members, administrators, graduate students, governing boards, alumni, philanthropists, and legislators.

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T. R. MCCONNELL, DOUGLAS E. SCATES, and FRANK N. FREEMAN, *The Conceptual Structure of Educational Research.* Supplementary Educational Monographs, No. 55. Chicago: University of Chicago, 1942. Pp. viii + 47. $0.90.

S. R. HUMBY and E. J. F. JAMES, *Science and Education.* Cambridge, England: University Press; New York: Macmillan Co., 1942. Pp. x + 145. $1.25.

MARJORIE H. THORPE, *When Can I Find—?* A Manual of Sources for Educational Research. 107 West Newell Street, Syracuse, New York: The Author, 1941. Pp. 24. $0.50.

VIRGINIA P. ROBINSON, Editor, *Training for Skill in Social Case Work.* Philadelphia: University of Pennsylvania Press, 1942. Pp. vi + 126. $1.50.

The publications listed above, although diversified in title and emphasis, deal with phases of research methodology or the conditions of productive scholarship. Such common interests and themes justify the grouping of these titles for brief characterization or review.

The Conceptual Structure of Educational Research is a symposium of three able papers presented in connection with the fiftieth anniversary celebration of the University of Chicago. The first paper, by McConnell on "The Nature of Educational Research," takes the position that the philosopohy and the science of education are closely related; that educational research must improve its methods of inquiry through knowledge of the basic sciences and related disciplines; that the controlling concepts and basic assumptions must be systematically outlined, so as to focus attention on the central problems in the major fields of research; and that methods of greater precision must be developed for investigating problems at higher levels of complexity and organization. In the second paper, "The Conceptual Background of Research," Scates identifies four factors that retarded the development of research: the early expedient of personifying objects and forces, mental dependency on the voice of authority, opposition on the part of inhospitable organized groups, and a paucity of energy and facilities for carrying on scientific inquiry. Scates takes the position that: the limited concepts of the worker frequently have produced unprofitable and misleading results; that instruments normally appear in response to a feeling of need, when a set of principles has developed to guide the use of such tools; and that research is not a simple matter of gathering facts, but rather begins with an idea and ends with an idea. Freeman, in his paper on "Controlling Concepts in Educational Research," analyzes the differences and the meeting ground between educational research and research in pure science. He maintains that the former is practical research, with practical concepts, which is not a science and therefore does not demand the creation of new scientific concepts, but leans heavily on the principles and methods of the social and biological sciences for problem solving. However, if education has been able to synthesize a body of concepts and methodology from such fields as psychology, so-

ciology, and history into a meaningful pattern of research, it matters little in the work of problem solving whether the resulting organization of knowledge is called a science or a field to which scientific principles and methods are applied.

Science and Education first points out what science has accomplished, particularly in physical and material ways, and what it has failed to do for society, especially in the solution of the complex social problems of human relationships. This opening discussion covers briefly many of the points analyzed at length by such publications as Bernal's *The Social Function of Science* (Macmillan, 1939) and Crowther's *The Social Relations of Science* (Macmillan, 1941). A discussion of science teaching in the schools, with particular reference to England, maintains that those trained in science are ignorant of the rudiments of the social studies, while specialists in political science, philosophy, and the "cultural" subjects know little of the scientific and technical forces that mould the society to be served. Other chapters deal briefly with the content and method of science courses, and with the teaching of scientific method.

Thorpe's little manual is a useful brief guide to the educational literature. She has also prepared a ten-page supplement for the field of home economics; in this connection, Brown's *Evaluation and Investigation in Home Economics* (Crofts, 1941) is of interest and might well have been listed. Thorpe's manual groups the guides under the headings of: summaries and surveys, bibliographies, lists of graduate theses and dissertations, dictionaries of terms, tests, institutional directories, and biographical dictionaries or directories. The listing of the call numbers is intended to render the guide especially useful at Syracuse University. It was inevitable that an attempt to describe so large a number of educational sources within twenty-four pages would result in some omissions and in occasional inaccuracies. The full-size guides, which could have been advantageously listed, include: for education as a special field of inquiry, Alexander's *How to Locate Educational Information and Data* (Columbia University, 1941); and for general purposes, Shores' *Basic Reference Books* (American Library Association, 1939) and Mudge's *Guide to Reference Books* (American Library Association, 1936, and later supplements).

Training for Skill in Social Case Work, by staff members of the University of Pennsylvania School of Social Work, is an addition to the rapidly increasing volume of literature concerned with problems of case study and case work. In the opening chapter Robinson defines skill as follows: "Skill is the capacity to set in motion and control a process of change in specific material in such a way that the change that takes place in the material is effected with the greatest degree of consideration for and utilization of the quality and capacity of the material" (p. 30). She describes three levels of skill for which training is essential: "First is the simple skill which the beginner can initiate and carry through in a single interview around a point of definition of function or explanation of a policy to a client. Second is the skill in controlling a process of movement in time where the student becomes responsible for his continuing part and for carrying the continuity of the experience with the client through to an ending. A third level of skill involves an understanding of growth as well as move-

ment in relation to a function" (p. 31). Succeeding chapters describe the training program of the Pennsylvania School of Social Work in its personality course, in field work, and in the integration of classroom learning and field practice. While the curriculum described is the program of a particular school, the principles represented may be applied to the training of case workers in other institutions and even in other fields where the case method is a major procedure in problem solving. Two chapters, not concerned specifically with the Pennsylvania curriculum, seek to clarify the concepts of "function," "process," and "the service agency" as basal to an understanding of skill in social case work.

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CHARLES T. HOLMAN, *Getting Down to Cases*. New York: Macmillan Co., 1942. Pp. xii + 207. $2.00.

Getting Down to Cases applies the techniques of case study to the problems of personal counseling encountered by the pastor. The minister shares these procedures with teachers, psychologists, sociologists, social workers, and with many other technicians who deal with problems of individual adjustment. A recurring theme throughout the book is that the pastor should return to his ancient task of personal counseling, with as much training as possible in the areas of: (1) psychological and social sciences; (2) social case work, mental hygiene and psychiatry, and educational and vocational counseling; (3) clinical experience in social case work agencies and in psychological or child-guidance clinics; and (4) development and adjustment of personality. Possibilities are indicated for cooperation of the psychiatrist, physician, and minister.

The illustrative cases are presented under headings relating to the embittered, fearful, guilt-stricken, irresponsible, incorrigible, and gangster. Each case is followed by the author's summary of the diagnosis and treatment employed. These cases are challenging, although reported in the language of the novel rather than of science. Appropriate subdivisions for each case would have assisted the reader in tracing the sequence of steps in study, diagnosis, treatment, and follow-up. A brief chapter outlines the techniques of counseling and case study suggested for the pastor's use, including tests, interviews, life histories, and case records, although only a few of the many references in the literature of these areas are cited. The non-technical language and semi-popular style render the book readable by ministers and others with little training in counseling, psychology, and sociology.

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HORACE B. ENGLISH and VICTOR RAIMY, *Studying the Individual School Child*: A Manual of Guidance. New York: Henry Holt and Co., 1941. Pp. viii + 131. $0.95.

ANNETTE GARRETT, *Interviewing*: Its Principles and Methods. New York: Family Welfare Association of America, 1942. Pp. 123. $1.00.

Studying the Individual School Child is a manual for teachers in service and in training that has developed from a course in child psychology. It is proposed that such a course be enriched by having each student make a case study of an individual child. Methods of gath-

ering data are outlined briefly, including diary observations, time samples, rating instruments, interviews, and analysis of documents. A series of chapters deals with intellectual, physical, social, and character development, and with preparation of the final report. The appendix includes a group of instruments for studying the individual child and an illustrative case study. An index might well have been prepared, an aid especially important in a manual. The style is simple and direct, with many of the suggestions addressed to the reader in the second person. The usefulness of this guide extends beyond students of child psychology and teachers to others who may wish a brief outline of the case method as applied to school pupils.

A practical, concrete handbook has been added to the literature of interviewing, which already includes: Bingham and Moore, *How to Interview*, Harper, revised 1941; Oldfield, *The Psychology of the Interview*, Methuen, 1941; and Young, *Interviewing in Social Work*, McGraw–Hill, 1935. Garrett writes from a background of social case work, a field in which skillful interviewing is especially important, and draws her illustrations from the same area. However, both the principles discussed and the illustrative interviews reported have pertinent applications to many other fields where case study, case work, and interview techniques are employed. The space is about evenly divided between principles or methods of interviewing and selected interviews with interpretative comment by the author. The treatment of appropriate procedures for interviewing is clear cut, but brief, with only three references to the literature of this area. The organization and titles of the chapters and smaller subdivisions leave something to be desired, in terms of logic and sequence. An index would have rendered this manual more usable.

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WILLIAMS, E. I. F. The Actual and Potential Use of Laboratory Schools in State Normal Schools and Teachers Colleges. Teachers College, Columbia University, Contributions to Education, No. 846 + X pages. 1942. $2.63.

This is both a survey and a progress report restricted to state normal schools and state teachers colleges in the United States. The author compiled the information over a period of several years rather than for one year only. He gives a historical view of the work of such schools containing some items not previously widely known; a general picture of the curricula of the institutions; detailed information about laboratory courses in teacher education; character of campus and off-campus laboratory schools; and potentially available off-campus schools.

A detailed list of conclusions and recommendations enrich the study. The appendices include valuable information on legislation about laboratory schools, and cooperative agreements with off-campus schools.

The writer suggests the following as quite significant specific facts reported:

1. From 1929–30 to 1937–38, the number of students actually completing a course in student teaching decreased from 33,919 to 23,732 (see pp. 84, 86). For the period 1933–34, to 1937–38, there was a decrease of 3154 or 28.2% students per institution, or 13.1% per institution.

2. The movement from a two-year program to a four-year program is very evident.

3. Few institutions allow flexibility in quantity of clock-hours required in student-teaching.

4. Typically, student-teachers receive experience in two school grades or two subjects.

5. A formula is provided to determine the necessary enrollment in an off-campus laboratory school. (see pp. 146–149).

6. Types of laboratory experiences are usually referred to as observation, participation and student-teaching. The movement in recent years to expand the *variety* of experiences is not evident from this study.

7. Most of the institutions are located within ten miles of needed and potential off-campus laboratory schools, but an appreciable number of them do not use these schools. (see pp. 220–221)

8. For many institutions, the table XII showing patterns of laboratory experiences will be useful. It is very significant, also, that in teachers' colleges, where it could be different, but 14% of the institutions are combining laboratory courses with subject matter courses. (see p. 60)

9. The proportion of institutions that waive a part or all of the laboratory experience is significant—and the chief reason is prior teaching experience. (see p. 80)

10. In spite of the fact that rural schools still have the most serious problem of securing teachers, but 28 institutions reported *rural* laboratory schools in 1934–35. (see p. 116)

11. The laboratory experiences provided and potentially available in off-campus schools are described in considerable degree but not in variety. (see pp. 141–146, 155–162)

12. The author sets forth advantages of written contracts for cooperating off-campus schools (p. 199) and recommends the use of such contracts as the wiser plan. (see p. 227)

Thirty-two separate recommendations are made and are worthy of serious consideration.

This volume is valuable for study and for reference. A director of student-teaching new to such work should refer to this as one of his sources of help. The various higher educational institutions and state school administrators will find it a very useful volume supplementary to the few other volumes in this field. It includes 147 well selected references, is well annotated, comparatively free from errors, and shows a scholarly acquaintance with the field.

It does not describe such work in liberal arts colleges or state universities, and thus omits several plans of such work worthy of consideration. It is not a treatise on the philosophy of teacher education, but it implies such a philosophy. Workers in this field are well served by this study.

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JAMES WESTFALL THOMPSON and BERNARD J. HOLM, *A History of Historical Writing*, Vols. I and II. New York: Macmillan Co., 1942. Pp. xvi + 676, x + 674. $14.00 per set.

The reviewer, like other workers interested in the history of education, of psychology, and of science in general, has found it necessary to depend primarily on the field of history for discussions of the techniques of historiog-

raphy. This literature on methodology includes numerous volumes devoted to the general principles of historical method, while within the past few years several comprehensive surveys have been made of the history of historical writing, as illustrated by the following works.

Barnes (*A History of Historical Writing*, University of Oklahoma Press, 1937) in a single volume appears to have been the first to attempt a history of history for substantially the entire period of recorded knowledge; the space limits of less than 450 pages have seriously cramped the treatment, with the result that some sections read like a running bibliography or a roll call of authors. Shotwell (*The History of History*, Columbia University Press, 1939) devotes one volume to early records and the contributions of Jewish, Greek, Roman, and Christian historical writing, and plans to cover in a second volume the period from early Christian times to the present. Kraus (*A History of American History*, Farrar and Rinehart, 1937) presents the first survey of the whole field of American historical writing. Three recent collections of essays in historiography are significant: two series on American history (Goldman, *Historiography and Urbanization*, Johns Hopkins Press, 1941; and Hutchison, *Marcus W. Jernegan Essays in American Historiography*, University of Chicago Press, 1937); and a third series dealing with selected European historians (Schmitt, *Some Historians of Modern Europe*, University of Chicago Press, 1942).

The publication under consideration, the two-volume work by Thompson, assisted by Holm, is the most comprehensive review of historical writing in print. It covers the period from earliest antiquity to the outbreak of the First World War, although no living historian is included and by intent no American writer is mentioned. In surveying the changing conceptions of history and the various fashions of writing it, the authors fit each author into the general intellectual background of the age represented and assign to each writer his place in the development of the contemporary historiography. The first volume traces the evolution of historical writing through the long period, up to the seventeenth century, when history was considered predominantly as literature. These chapters are grouped under the larger headings of: Antiquity, Western Europe in the Middle Ages to the End of the Thirteenth Century, Eastern Europe and the Orient to the End of the Crusades, Close of the Middle Ages, and the Renaissance, Reformation, and Counter-Reformation. The second volume deals with: the rise of modern historical scholarship through the periods of erudition, reason, enlightenment, and romanticism; founding of modern historical scholarship in Germany; French and English historians of the nineteenth century; historians of institutions; ancient Orient, classical antiquity, and Byzantine studies; church historians of the nineteenth century; and minor countries of Europe.

It is a matter of regret that the senior author did not live to see this prodigious piece of work in print; Thompson died in September, 1941, shortly after manufacture of the two volumes had begun. The footnote and bibliographical references alone total nearly three thousand items. In spite of the large number of citations, the format is handsome and the style attractive. It seems almost incredible that, even in a long life-time, one person

with some assistance could do the reading and study necessary to evaluate so wide a range of literature.

As a next step in historiography, it may be that the time is near when some historian will consider the histories of historical writing themselves sufficiently numerous to merit a volume of appraisal. As a less advanced move in the field of education, the literature is now so extensive as to justify a full-size treatment of educational historiography, covering the pertinent historical writing. As exploratory bibliographical summaries in this area, the October, 1936, and October, 1939, numbers of the *Review of Educational Research* include nearly 1900 references dealing with the history of education and comparative education.

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TRIGGS, FRANCES ORALIND. *Improve your reading.* A Manual of Remedial Reading Exercises. Minneapolis, The University of Minnesota Press, 1942. 127 pp.

This manual is based on the assumption that most college students do not know how to read efficiently. It tells what skills are necessary for good reading and how they may be acquired. The daily exercises are planned for a five weeks' period with a daily assignment requiring about an hour of work. The author hopes that the work can be done under the guidance of an adviser but it is possible to work alone effectively by using the key to the assignments, found at the end of the book.

The assignments deal with the following skills: reading with a definite purpose in mind, skimming, rate of reading, vocabulary growth, appreciation of words, concentration, understanding what is read, remembering what is read, use of the library, critical reading, pleasure in reading, and efficient use of time. The key gives nothing that the student can find for himself in the dictionary or in the explanatory sections. Neither does it give answers that he can get from his own experience.

I consider this manual an excellent one and recommend its wide use. It will appeal to college students because of its clever style, its wide range of socially significant content and its great variety of schemes used in the development of important skills. The drills cannot become monotonous because they are so challenging. They require wide reading both for work and pleasure purposes, and use all types of current materials—literary, economic, social, etc. Constant self appraisal is stressed. Surely students will acquire desirable attitudes and interests through such broad reading experiences and will develop a keener interpretation of life today.

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